Essays in International Macroeconomics

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BY

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Non-Technical Summary

This dissertation consists of three essays in international macroeconomics. It lies at the intersection of balance of payments analysis and sectoral financial analysis. In particular, it makes use of newly available financial accounts data by institutional sector to revisit key issues in international macroeconomics.

The first essay (Chapter 2) revisits the period of substantial widening of external imbalances in the run-up to the global financial crisis and their adjustment since then. We take a granular look at these imbalances through the lens of their domestic counterpart: the net financial balance of the household sector, the government, non-financial corporations, and financial corporations. Our findings challenge the often-claimed view that the household sector lies behind most of the dynamics of the current account. In fact, we show that it is the non-financial corporation and the government sectors that account for the bulk of: (i) the co-movement with the standard set of fundamental covariates of the current account; (ii) the external adjustment and expenditure reduction in the aftermath of the global financial crisis; and (iii) the diverging dynamics during large and persistent current account imbalances. These results emphasize that analyzing domestic sectoral balances can lead to a better empirical and theoretical understanding of global imbalances.

In the second essay (Chapter 3), we look at the relation between aggregate household wealth dynamics and the net international investment position (NIIP). Household wealth is closely associated with fluctuations in the economy. However, the linkages between household wealth dynamics and cross-border financial holdings have remained unexamined. Thanks to the recent assembly of an essential dataset (Piketty and Zucman, 2014), this paper assesses these co-movements in selected advanced economies. We establish that increases in net household wealth are associated with deteriorations of the NIIP. This pattern is primarily driven by valuation changes in wealth (mostly through house price appreciation). Overall, we find that capital gains on household wealth are strongly related to the accumulation of net external debt liabilities, a key indicator of financial vulnerability.

In the final essay (Chapter 4), we use corporate financial balance sheets to estimate the share of foreign portfolio ownership of domestic equities. The essay shows that the current national accounting principles can significantly cloud the interpretation of key macroeconomic statistics in highly globalized economies. A key concept in the balance of payments is the difference in the recording of income between foreign direct investors and foreign portfolio investors. Profit is booked for direct investors as it occurs, but only when it is paid-out via dividends for portfolio investors. In the past few decades, a combination of increases in corporate retained earnings, cross-border holdings, and the changing nature of foreign direct investment flows, has amplified the distortions caused by this principle. Using the national accounts and bilateral foreign portfolio holdings, we estimate the scale of retained earnings attributed to foreign portfolio investors. We show this correction leads to a significant redistribution of (recorded) income in highly globalized economies. In turn, we find that key policy variables such as the current account and gross national income can be misleading.

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Chapter 1

General Introduction

This dissertation is a collection of three essays in international macroeconomics. A common theme running through the essays is the importance of studying international and sectoral financial balance sheets in tandem. In particular, they make use of newly available financial accounts data by institutional sector (households, the government, non-financial corporations, and the financial sector) to revisit key issues in international macroeconomics and provide new insights into the dynamics and measurement of the external imbalances.

In the first essay (Chapter 2), we revisit the period of substantial widening of external imbalances in the run-up to the global financial crisis and their adjustment since then. We take a granular look at these imbalances through the lens of their domestic counterpart: the net financial balance of the household sector, the government, non-financial corporations, and financial corporations. For instance, consider a country that is running a current account deficit (that is, with a level of domestic spending that exceeds domestic output, or alternatively a level of investment that exceeds saving). This deficit will be reflected in at least one of the domestic sectors of the economy. Typically, one would expect the non-financial corporation sector to run a net financial deficit, i.e. to borrow in order to fund investment, the household sector to run a net financial surplus, i.e. to be a net saver for life-cycle or precautionary reasons, and finally, the financial corporation sector to intermediate the funds. We use these balances to revisit three central questions of external imbalances analysis. To this end, we build a dataset of net financial balances by institutional sector for 30 advanced economies and 5 emerging European economies over the 1995-2015 period.

Our main finding challenges the often-claimed view that the household sector lies behind most of the dynamics of the current account. In fact, we show that it is the non-financial corporation and the government sectors that account for the bulk of the patterns. These results come

from the three stages of our analysis. First, we look at the standard panel regressions of current account covariates that are widely used in applied policy analysis. If we run these regressions at the sectoral level, we see that these covariates have very little explanatory power for household balances. These covariates, such as demographic indicators, for instance, are more strongly correlated with government and non-financial corporates balances. Second, we examine the period of external adjustment and expenditure reduction in the aftermath of the global financial crisis. The lion's share of the adjustment took place in the non-financial corporate sector. Third, we look at sector flows during episodes of large and persistent external imbalances, with similar results. These results emphasize that analyzing domestic sectoral balances can lead to a better empirical and theoretical understanding of global imbalances.

The second essay (Chapter 3) focuses on the dynamics of external balance sheets. It studies the relation between aggregate household wealth dynamics and the net international investment position (NIIP). Household wealth is closely associated with fluctuations in the economy. In the past few decades, there has been an increase in aggregate household wealth in advanced countries. In addition, these countries have experienced a rise in international financial integration and NIIP dispersions. However, the linkages between household wealth dynamics and cross-border financial holdings have remained unexamined.

In order to do this, we look at the covariation patterns between changes in the NIIP and household wealth in selected countries over the 1970-2013 period. Thanks to the recent assembly of an essential dataset (Piketty and Zucman, 2014), this paper assesses these co-movements in selected advanced economies. In particular, we document a striking negative correlation between changes in (lagged) household wealth and the net international investment position and the current account that survives the inclusion of the control variables found in the literature. Furthermore, it finds that an increase in household savings (flow accumulation) is associated with an improvement in the external balance sheet. In contrast, house price gains (as captured by stock-flow adjustments in the household accounts) in one period is associated with increases in external debt liabilities in subsequent periods.

The final essay (Chapter 4) uses corporate financial balance sheets to estimate the share of foreign portfolio ownership of domestic equities. It shows that the current national accounting principles can significantly cloud the interpretation of key macroeconomic statistics in highly globalized economies. The past few decades have seen a rise in retained corporate profit in advanced economies. At the same time, global firms and global investors have accumulated a growing share of the ownership of domestic firms. These trends have made the measurement of cross-border investment income considerably more difficult, in particular as statistical conventions have struggled to adapt to globalization.

A key concept in the balance of payments is the difference in the recording of income between foreign direct investors and foreign portfolio investors. Profit is booked for direct investors as it occurs, but only when it is paid-out via dividends for portfolio investors. In the past few decades, a combination of increases in corporate retained earnings, cross-border holdings, and the changing nature of foreign direct investment flows, has amplified the distortions caused by this principle. Typically, foreign direct investment (FDI) is associated with mergers and acquisitions or real capital expenditures. However, recent papers have highlighted that a growing share of FDI flows reflects primarily the complexity of the corporate structure of large multinational corporations (MNEs) and no longer decisions based on long-run factors. As FDI flows depart more and more from their traditional form, it is essential to quantify the impact of the current accounting rules on measured flows.

Using the national accounts and bilateral foreign portfolio holdings, we estimate the scale of retained earnings attributed to foreign portfolio investors. We show this correction leads to a significant redistribution of (recorded) income in highly globalized economies. In turn, we find that key policy variables such as the current account and gross national income can be misleading. This correction leads to a significant redistribution of income between highly globalized economies. It varies across countries based on the scale and location of the international portfolio balance sheet and corporate retained earnings. We find the largest average negative corrections are in countries with very large negative net foreign portfolio asset positions. This is the case for Luxembourg, Japan, Korea, Ireland, and Switzerland for instance.

Likewise, the largest positive corrections are in countries with creditor net foreign portfolio asset positions. This translates to average corrections larger than 2 percent of GDP for Norway, Singapore, the Netherlands, Canada, and Sweden. In turn, correcting for retained earnings of portfolio investors increases and decreases measured current account imbalances depending on the structure of the country's external balance sheet. Importantly, the large key surpluses of Switzerland and Germany are reduced by, on average, 2 and 1 percent of GDP respectively. However, imbalances are exacerbated in Norway and the Netherlands, by 8 and 2.5 percent of GDP respectively. Next, our correction will also impact the growth of GNI, albeit at a smaller scale. We find significant positive and negative correction episodes in a similar set of highly globalized countries. Finally, this will also allow us to shed light on the share of valuation changes on external portfolio balance sheets (measured in the stock-flow adjustment) due to current production, i.e. retained earnings, and other capital gains due to asset price changes. We find a considerable share of changes in portfolio valuations cannot be accounted for by retained earnings.

Lastly, Chapter 5 offers a general conclusion.

Chapter 2

Revisiting External Imbalances: Insights from Sectoral Accounts[1]

[1] A version of this paper was published in the *Journal of International Money and Finance*, Volume 96, September 2019, Pages 67-101.

2.1 Introduction

Understanding the dynamics of external imbalances remains at the forefront of both the academic and policy agenda. In the past few decades, financial globalization has led to a well-documented widening of current account balances. Despite a large and costly contraction of global imbalances in the aftermath of the global financial crisis, significant current account deficits and surpluses persist, particularly in advanced economies.[2] Much less discussed, however, is the domestic counterpart of these imbalances, the net financial balances of the household sector (HH), the government (GOV), non-financial corporations (NFC), and financial corporations (FC). Each net financial balance represents the saving-investment balance of that sector (or alternatively income-expenditure balance of that sector) and their sum is equal to the current account.[3][4]

Consider a country that is running a current account deficit (that is, with a level of domestic spending that exceeds domestic output, or alternatively a level of investment that exceeds saving). Accordingly, this country is a net borrower from the rest of the world, which entails well-known risks (Obstfeld, 2012). Given the economy-wide resource constraint explained above, this external deficit will be reflected in a deficit in at least one of the domestic sectors. Typically, one would expect the NFC sector to run a net financial deficit, i.e. to borrow in order to fund investment, the HH sector to run a net financial surplus, i.e. to be a net saver for life-cycle or precautionary reasons, and finally, the FC sector to intermediate the funds.

It is often assumed that saving and portfolio decisions of the HH sector play a central role in explaining the behavior of the current account, both theoretically and empirically. In the textbook intertemporal model, the current account is fully determined by forward-looking decisions made by the representative household (Obstfeld and Rogoff, 1995). In this context, and in most standard models, the NFC sector is fully owned by the representative agent.[5] This assumption may explain the relative lack of attention to corporate saving and portfolio decisions in the international macroeconomic literature.[6] Furthermore, more recent theoretical work has focused on households' portfolio choice as a key for explaining global imbalances (see, in particular, Mendoza, Quadrini, and Rios-Rull, 2009 and Gourinchas and Obstfeld,

[2] See Menzie D. Chinn's Jackson Hole speech (Chinn, 2017).

[3] The net transactions between domestic sectors cancel out at the aggregate level, giving us the net resource flow with the rest of the world.

[4] Although less discussed in the academic literature, the financial press and policy circles have highlighted the insights of net financial balances (see Martin Wolf (Financial Times, November, 2015), Matthew C. Klein (Barron's, July, 2018), IMF (2017a), and Guntram B. Wolff (Bruegel, May, 2018) for recent examples).

[5] This assumption is called the "corporate veil" hypothesis, analogous to the Ricardian equivalence. It follows that any changes in NFC saving will be offset by changes in HH saving

[6] Notable exceptions include Bacchetta and Benhima (2015b) and Fan and Kalemli-Ozcan (2016).

2012), or household saving for life-cycle motives (Coeurdacier, Guibaud, and Jin, 2015). Another avenue of research has focused on the role of the GOV sector balances in explaining external imbalances commonly called the "twin deficits". In turn, these models have shaped the standard empirical current account regressions underlying policy analysis. However, in contrast to these predictions, there is no clear relationship between the net financial balances of the HH sector and the current account in the data. In addition, the recent and widespread shift of the NFC sector into puzzling net financial surpluses in advanced economies casts doubt on these prevailing assumptions (see for instance Chen, Karabarbounis, and Neiman 2017). The increasingly pervasive role of global firms and global investors has also further delinked domestic households and the ownership of the corporate sector (Avdjiev et al., 2018).[7] In view of these trends, sectoral heterogeneities warrant a more detailed and systematic analysis in the context of external imbalances.

This paper revisits the core question of the external imbalances and their adjustment through the lens of their domestic counterpart in the national accounts. To this end, we build a dataset of net financial balances by institutional sector for 30 advanced economies and 5 emerging European economies over the 1995-2015 period. Using this framework, we take a fresh look at three widely studied and policy-relevant topics in the external imbalances literature: (i) the medium-term covariates of the current account; (ii) the adjustment since the crisis; and (iii) large and persistent imbalances. Taken together, our results challenge the often-claimed view that the HH sector plays a central role in current account dynamics. In fact, we show it is the net financial balances of the GOV sector and, perhaps more surprisingly the NFC sector, account for the bulk of these patterns. This is important since much of the theoretical literature described above have focused on saving and portfolio decisions of the HH sector or the deficits of the GOV sector, with relatively less attention paid to the NFC sector.

These results are persistent across the four stages of our analysis. First, we show there are systematic differences between external surplus and deficit countries in terms of sectoral balances. This is largely due to the NFC sector net surplus in surplus countries in the past few decades and net deficits of the GOV sector in deficit countries since the global financial crisis. In contrast, the dynamics of the HH sector are very similar in both sets of countries. Second, we offer a new take on the standard medium-term covariates of external imbalances and show that the bulk of the explanatory power of these variables is accounted for in the GOV and NFC sectors. Third, we reexamine the post-crisis external adjustment process and find that it was mainly reflected in expenditure reduction in the corporate sector as opposed to the HH sector. These results are consistent with the narrative of external adjustment through expenditure reduction instead of expenditure switching, established by Lane and Milesi-Ferretti (2012).

[7] In particular, the share of foreign ownership of the domestic corporate sector grew from 15 to 30 percent from 1995 to 2015 in our sample of countries (Allen, 2018b).

In other words, a large share of the closing of current account imbalances happened through increases in NFC saving or a reduction of investment, as opposed to a reduction of consumption by the HH sector.[8] Finally, we study the accumulation of wealth or build-up of liabilities in the domestic sectors during episodes of large and persistent capital inflows (or current account deficits) and outflows (or current account surpluses). We find that the HH sector accumulates similar net financial surpluses in both types of episodes. Overall, the empirical insights in the paper can provide guidance for future empirical and theoretical research in international macroeconomics.

Our contribution is linked to the ever-expanding literature on the patterns of international balance sheets and capital flows. Recent papers have highlighted aggregate patterns of cross-border capital flows are not always indicative of underlying cross-border sectoral relationships (see Alfaro, Kalemli-Ozcan, and Volosovych, 2014, Galstyan et al., 2016, Avdjiev et al., 2017, and Cerutti and Hong, 2018 for instance). Avdjiev et al. (2017) in particular show that in advanced economies most direct cross-border financial transactions are undertaken by banks. However, focusing solely on sector cross-border transactions does not give us a clear understanding of which sectors of the economy are the underlying counterpart of foreign borrowing due to the intermediation role of banks (Lane, 2015b). For instance, firms or households can borrow directly from the rest of the world or indirectly through the banking sector. In both cases, shifts in the financial balances of these sectors will be associated with a corresponding shift in the current account. Studying domestic balances and the current account in tandem allows to capture the vulnerabilities arising from both of these cases, unlike the previously cited papers.

Our paper is also related to the large literature that studies the relationship between current account balances and a set of economic fundamentals, with the idea in mind that balanced current accounts were not the correct benchmark for external sustainability (see, for example, Chinn and Prasad, 2003, Chinn and Ito, 2007, Lane and Milesi-Ferretti, 2012, and Phillips et al., 2013).[9] Indeed, current account deficits can be consistent with underlying economic fundamentals, such as demographics or levels of development. Understanding how these covariation patterns are reflected in the medium-term fluctuations of sectoral balances can yield valuable insights. Additionally, prior to the crisis current account imbalances often exceeded levels consistent with these fundamentals, contributing to the severity of the post-crisis adjustment, as highlighted by Lane and Milesi-Ferretti (2012, 2015). Up until now, it

[8] McCauley et al. (2019) show that most of the cross-border contraction in flows was due to a decrease in cross-border banking. We show that in terms of domestic saving-investment balances, this is reflected mainly in the NFC sector.

[9] As the object of this paper is not to establish new drivers of the current account, but to study their relationship with the domestic sectoral counterpart of the current account, our regressions resemble the ones of the papers cited above.

was not known how these findings carried through to the sectoral level. We document the contribution of each sector balance to the closing of these excessive imbalances.

Moreover, given the importance of the corporate sector in our results, this research is related to the growing literature that documents higher corporate (retained) earnings and shift of the corporate sector from a net borrower to a net saver. Competing explanations for this trend include rising profits on the back of decreasing labor shares (Chen, Karabarbounis, and Neiman, 2017), under-investment (Gruber and Kamin, 2016), financial frictions issues in Emerging Asia (see amongst others Bacchetta and Benhima, 2015b and Fan and Kalemli-Ozcan, 2016), corporate governance (Aoyagi and Ganelli, 2017 and Bayoumi, Tong, and Wei, 2012 for example) and the growing of importance of intangible capital (Falato, Kadyrzhanova, and Sim, 2013). In addition, Zetlin-Jones and Shourideh (2017) show that the decision for a firm to fund itself externally or internally has implications for the propagation of financial shocks.[10] However, little is known of the linkages between the corporate saving glut and the current account in advanced economies.

This paper has many policy implications, as a better understanding of the domestic implications of cross-border financial flows is essential for macroeconomic and financial stability (Obstfeld, 2012). Indeed, large and persistent external deficits can lead to the creation or amplification of domestic distortions, upward pressure on asset markets, fiscal and banking volatility but also to potential sudden stops in net flows and debt rollover problems (Lane, 2015). Large current account surpluses can also be problematic at a global level, as they have to be matched by a corresponding deficit, and at a domestic level, as they can reflect structural distortions (IMF, 2017a).[11] For instance, our findings suggest tackling distortions in the NFC and GOV sectors might be more likely to generate balanced current accounts than policies aimed at HH sector saving. Our analysis calls for a joint framework for analyzing global imbalances and sectoral flows.

The rest of this paper is structured in the following manner. First, we review national accounts identities and describe our dataset. Then, we shed light on the broad stylized facts and correlation patterns between sectors. In section 4, we present the empirical analysis of medium-term covariates of the current account. Section 5 examines the external adjustment since the crisis, and finally, we perform an event study investigating the contribution of sectoral balances to external episodes. Section 7 offers some conclusions and possible extensions.

[10] Our work is also linked to the literature on sectoral accounts, Behringer and Treeck (2018) and Carvalho (2015). In particular, Behringer and Treeck (2018) study the link between sectoral balances and the current account through the lens of a rise in inequality.

[11] This has been recognized by policymakers and regulators since the crisis, with the establishment in 2011 of the Macroeconomic Imbalance Procedure (MIP) to identify macroeconomic domestic imbalances in EU countries, for instance.

2.2 A New Decomposition of the Current Account

This section reviews the basic concepts that will be used throughout this paper and introduces our data.[12]

2.2.1 Conceptual Framework

Traditionally, the current account is decomposed into either the difference between exports and imports (and net foreign income) or the difference between saving and investment (e.g. Chinn and Prasad 2003). However, in recent years there has been an increase in the availability of sectoral balance sheet data in most advanced economies, allowing us to break down the current account balance into the sum of the net financial balances of the HH sector, the government, non-financial corporations, and the financial sector.[13] As flows across domestic sectors cancel out in the aggregate, we have the following identity:

$$CA_{it} = NFB_{it}^{HH} + NFB_{it}^{GOV} + NFB_{it}^{NFC} + NFB_{it}^{FC} \tag{2.1}$$

with the current account balance denoted CA_{it} and NFB_{it}^{s} is the net financial balance of sector (s) (HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations). Improvements in the net financial balance of one sector will improve the current account balance, everything else equal.

Just like the current account at the aggregate level, the financial balance of each sector is equal to income minus total expenditures of that sector. In addition, the net financial balance of a sector can be derived as saving less investment (on the real side) or calculated as the difference between the net acquisition of financial assets and net incurrence of financial liabilities (on the financial side). Moreover, a financial surplus (a net lending or saver balance) indicates the sector is a net acquirer of financial assets, whereas a deficit (a net borrowing balance) indicates the sector is running down its financial assets (or increasing its borrowing) to fund its spending. Just like its external counterpart, there can also be sizeable discrepancies between the real and the financial side. For this analysis, we use the net lending from the financial accounts.

[12] For further information on the compilation of sectoral financial accounts see OECD (2017).

[13] There exists discrepancies between the current account and the flows in the rest of the world accounts from the sector accounts. However, they are conceptually equivalent, see Appendix A for more details. We use the current account balance, but our findings are robust to using the rest of the world balance.

Additionally, national accounts identities allow us to decompose the change between the net international investment position (NIIP) between t and $t-1$ in the following manner:[14]

$$NIIP_t - NIIP_{t-1} = CA_t + SFA_t \tag{2.2}$$

where SFA_t is the Stock-Flow Adjustment term, used as a proxy for revaluation changes.[15]

In turn, this allows us to decompose both the net international investment position and the stock-flow adjustment across domestic counterparts:

$$NIIP_{it} = NFP_{it}^{HH} + NFP_{it}^{GOV} + NFP_{it}^{NFC} + NFP_{it}^{FC} \tag{2.3}$$

$$SFA_{it}^{NIIP} = SFA_{it}^{HH} + SFA_{it}^{GOV} + SFA_{it}^{NFC} + SFA_{it}^{FC} \tag{2.4}$$

with NFP_{it} is the Net Financial Position of each domestic sector (s) of the economy.

These decompositions will allow us to subsequently study the contributions of each sectoral balance to the current account, the covariation patterns between the standard set of fundamentals of the current account and sectoral balance, the international adjustment process since the crisis, and finally the patterns of sectoral balances during episodes of current account imbalances.

2.2.2 The Data

While net financial balances and positions by institutional sector provide a new and unique perspective on cross-country external imbalances, as of yet, they have not been used for this purpose. A possible explanation for this is that sectoral data has only become more widely available in the past few years.[16] In addition, data is mostly only available for advanced economies, a clear limitation that needs to be taken into account when examining the results. In order to build our dataset, we combine data from sectoral financial accounts compiled by Eurostat and the Organization for Economic Co-operation and Development (OECD). We use both the financial holdings of each sector and the financial transactions occurring between

[14] We have $FA_t = -(CA_t + KA_t + EO_t)$. FA_t is the financial account balance, KA_t pertains to the capital account balance and EO_t is the net errors and omissions. For simplicity, we assume KA_t and EO_t are equal to 0.

[15] The Stock-Flow Adjustment term is composed of a valuation term, the net capital gain on the existing holdings of foreign assets and liabilities, and a term capturing net other non-flow changes to the net international investment position (for example, due to changes in reporting methods and data revisions). See Curcuru, Thomas, and Warnock (2009) for further discussion on the importance of the net other statistical term.

[16] At the policy level, the G20 data gaps initiative in 2009 is central to this development. It identified strengthening the availability of these data key to addressing the gaps in data revealed by the global financial crisis. Emerging economies have been slower to publish sectoral data.

sectors to study stock and the flow dimension. These accounts are annual, non-consolidated, and based on the harmonized methodology of the System of National Accounts (SNA) and the European System of Accounts, see UN (2008) and Eurostat (2013).

Our resulting dataset is an unbalanced panel of 35 countries spanning the 1995-2015 period. In total, it comprises of 30 advanced economies and 5 emerging European economies.[17] In order to study the systematic differences between current account surplus and deficit countries, we split the sample into surplus or deficit countries based on their current account balance in 2007, the eve of the global financial crisis, following IMF (2017a).[18] In the first part of our analysis (Section 3 and Section 4), we restrict our dataset to a balanced sample of 23 countries where data is available over the whole period. In the following part of our analysis (Section 5 and Section 6), we use a wider set of countries where data is available from 2005 to 2015. The detailed list of countries is available in Appendix B.

2.3 Sectoral Balances and Global Imbalances

This section describes the contribution of sectoral balances to the current account balance (the flow side) and of sectoral positions to the net international investment position (NIIP) (the stock side) from 1995 to 2015. Finally, we shed light on how each sectors' net transactions and holdings are associated with the current account and the NIIP respectively. Crucially, we find that the systematic differences between current account surplus and deficit countries are due to differences in the NFC and GOV sectors and not the HH sector. In addition, even as net external flow imbalances have shrunk, net international position imbalances have expanded.

2.3.1 Sectoral Contribution to the Current Account Balance

Using the national account decomposition described above, Figure 2.1 shows the weighted average contribution of each sector to the current account balance in current account deficit and current account surplus economies.[19]

[17] We exclude countries for which we have no data prior to 2005. The country classification is based on the IMF's World Economic Outlook.

[18] We also cumulate current account balances from 1995 to 2007 and find the same country split.

[19] Figure 2.9 shows the unweighted sector contribution by country group. We see that the decreasing HH saving in the United States in the pre-crisis period, partly due to the house price boom, and the constant HH saving in Germany have a strong impact on the aggregate flows.

There are striking systematic differences in the patterns of the domestic counterpart of external balances in current account surplus and deficit countries. First, the size of the domestic sectoral balance, the counterparts of the current account, are considerably larger in deficit countries. This could reflect, in part, the increased financial integration, but also, country-specific demand booms in the run-up the crisis. Whereas the net lending balance of the HH sector experienced a similar decreasing trend in both sets of countries in the pre-crisis period, deficit countries have on average significantly larger GOV and NFC net borrowing balances.

Second, we see a large reduction in external imbalances in the aftermath the crisis in deficit countries (even large deficits persist in the United States and the United Kingdom). However, significant surpluses remain, particularly in countries like Germany, the Netherlands, and Japan. Since the crisis, GOV deficits have appeared in surplus countries but they remain a lot smaller than in deficit countries. In addition, there was a large contraction in the NFC net borrowing balances in countries with current account deficits, mirroring the contraction in the external balance.

To get a clearer picture of the trends of each sectoral flow, Figure 2.2 shows the median flow of each sector. We see a clear difference in levels between current account surplus and deficit countries for the median NFC and GOV sectors flows. However, the dynamics are very similar for the HH and FC sectors, with similar post-crisis median values in both types of countries. Thus, the previously discussed models that rely on HH sector dynamics to explain differences between current account surplus and deficit countries will yield counter factual predictions. In the aftermath of the crisis, the average balance of the GOV sector went from net surplus to net deficit in surplus counties. In deficit countries, the NFC sector reversed its large deficit, reaching similar median levels as current account surplus countries.

Finally, we turn to the cross-country correlation patterns between domestic financial balances and the current account. Figure 2.3 shows there is a strong systematic positive relationship between the cumulated current account balance and the cumulated net financial balance of the NFC sector and the GOV sector. Indeed, larger cumulative net lending balances of the NFC and GOV sectors tend to go hand in hand with larger current account surpluses. Surprisingly, we can also note that there exists no such correlation pattern in relation to the FC and HH sectors.[20] The sharp increase in corporate earnings, coupled with increasingly important roles for global firms and investors are possible explanations for these patterns (see Figure 2.10).

[20]However, it is important to bear in mind that a large portion of the household sector's net worth is in the form of non-financial assets not present in their net financial balance (mainly real-estate holdings). Allen (2018a) shows that households' housing assets and capital gains have a strong negative association with changes in the external position, and particularly with the net international debt position.

To summarize, even though current account imbalances have shrunk since the crisis, domestic imbalances have not. Moreover, there are systematic differences between the domestic counterpart of current account surpluses and deficits, mostly due to net lending balances in the NFC sector in surplus countries and net borrowing balances of the NFC and GOV sectors in deficit countries since the global financial crisis. Overall, there is no systematic relationship between the current account and the HH sector in the data, in contrast to predictions from a large class of models that rely on the HH sector to explain global imbalances.

2.3.2 Sectoral Contribution to the Net International Investment Position

In relation to the domestic counterpart of the NIIP, the overall trends are more stable, with a general increase in external imbalances (Figure 2.4).[21] The net external position improved to approximately 42 percent of GDP in surplus countries and deteriorated to around -61 percent of GDP in deficit countries in 2015. Overall, Table 2.1 shows that structurally the NFC sector tends to have large negative positions, the HH sector large positive positions, the GOV sector relatively smaller negative positions, and the FC sector approximately balanced positions.

Table 2.1 shows that current account deficit countries have systematically larger HH surplus positions and more negative NFC and FC deficit positions, with this pattern accentuating over time. Interestingly, it is only since the global financial crisis that deficit countries also have more negative net GOV positions, with similar positions in 2002 and 2007.

We see that during the 2002-2007 period, the net position of the NFC sector deteriorated in our sample of both deficit and surplus countries (by 23.6 percentage points). However, from 2007 onwards, the net position improves in surplus countries (by 10 percentage points) and deteriorates in deficit countries (by 10 percentage points). Moving to the GOV sector, its net position rose between 2002 and 2007, only deteriorating slightly in deficit countries. However, it decreased by 32 percentage points from 2007 onwards, due to a large deterioration of its net position in deficit countries (it worsened by 46 percentage points in deficit countries and improved by 8 percentage points in surplus countries). Households' net position improved by 18 percentage points between 2002 and 2007 and 46 percentage points since 2007, due to a large accumulation of net assets in deficit countries (over 80 percentage points over the 2002-2015 period compared to a modest improvement of under 3 percentage points in surplus countries). Finally, the FC net position has improved by around 4 percentage points in both

[21] Figure 2.11 shows the unweighted sector contribution by country group. We see that the government (and external) position deteriorates due to less weight put on Norway's GOV surplus (and net external surplus) position.

periods, with larger increases in deficit countries over the 2002-2007 period and in surplus countries post 2007.[22]

In sum, even as net external flow imbalances have shrunk, net international position imbalances have expanded. The domestic counterpart of this expansion has been largely reflected in a deterioration of the NFC sector balance in all countries prior to 2008, and since then in a deterioration of the net position of the GOV and NFC sectors in deficit countries. The balance sheet of the HH sector has recovered significantly in deficit countries (largely due to valuation gains), but not enough to stop a deterioration of the external position.[23]

Building on these stylized facts, our empirical strategy is threefold. First, in the next section, we will present our econometric specification of medium-term covariates of the current account. We will examine how the net sectoral balances are associated with the set of macroeconomic fundamentals usually used in the literature to analyze the current account. In the following section, we will examine the contribution of sectoral balances in the international adjustment process in the aftermath of the global financial crisis. Finally, we will perform an event study investigating the dynamics of sectoral balances during significant and persistent current account surplus and deficit episodes.

2.4 Sectoral Balances and the Covariates of the Current Account

2.4.1 Empirical Strategy

As previously outlined, the first step in our empirical work is to revisit the question of the medium-term covariates of external imbalances by analyzing the correlation patterns of a standard set of macroeconomic fundamentals with the sectoral counterpart of current account balances. In order to accomplish this, we run the following panel OLS regressions with time fixed effects in the spirit of Chinn and Prasad (2003), Chinn and Ito (2007), Lane and Milesi-Ferretti (2012), and Phillips et al. (2013):[24]

[22] If we decompose the change in stock positions between flows (i.e. cumulated net balances) and stock-flow adjustments (i.e. valuation gains or losses), Figure 2.12 shows different patterns across time periods (the boom phase 2001-2007 and the crisis 2008-2013) and type of country. The striking finding of this figure is that changes in valuation are a lot larger than changes in flows.

[23] Figure 2.13 shows the association between the change in the net international investment position and the net financial wealth of the domestic sectors.

[24] As a robustness check, we run OLS estimations on two-year and four-year averaged data and as well as annual data with similar results. We also run Seemingly Unrelated Regressions (SUR) with similar results (available upon request).

$$CA_{it} = \alpha + \beta X_{it} + \delta_t + \epsilon_{it} \tag{2.5}$$

For the conventional covariates of the current account, X_{it}, we use the same macroeconomic fundamentals as in Lane and Milesi-Ferretti (2012).[25] These variables include demographic factors (old-age dependency ratio, aging speed, and population growth), GDP growth, the level of GDP per capita, the lagged net international investment position, and dummies for the global financial crisis and for financial centers.[26] From a life-cycle perspective, we expect both a higher old-age dependency ratio and higher population growth to have a negative effect on the current account balance, as retirees typically draw down their saving for the former and the very young do not save for the latter. In contrast, a higher value for aging speed represents a population getting older at an increasing speed and should lead to more saving and have a positive effect on the current account. In relation to the income-related variables, high GDP growth is expected to be negatively associated with the current account and the level of GDP per capita to be positively associated, as countries converge in terms of income. In addition, we want to be able to compare the explanatory power of the set of fundamentals across all sectors, including the GOV sector itself. To this end, we omit the GOV sector fiscal balance.[27] Likewise, for the balance of each sector (s) (HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations) we have:

$$NFB^s_{it} = \alpha^s + \beta^s X_{it} + \delta^s_t + \epsilon^s_{it} \tag{2.6}$$

Our dependent variable NFB_{it} is the Net Financial Balance of each institutional sector of the economy. As mentioned above, the net financial balance of a sector can be derived as saving less investment or as the difference between the net acquisition of financial assets and net incurrence of financial liabilities. In addition, the sum of the domestic net financial balance equals the current account of the economy as a whole. In our main specification, we average the net flows in 3-year non-overlapping periods to smooth business-cycle fluctuations.[28] In a similar vein to the previously cited literature, we do not include country fixed effects, as they would remove a lot of the variation we are interested in explaining.

[25] As a robustness test, we also use the macro covariates used by Chinn (2017) and the IMF External Balance Assessment (EBA-lite) and our main findings persist.

[26] The dependency ratio is the ratio of the population over 65 years old relative to the working-age population (between 30 and 64 years old). Aging speed is determined as the difference between the expected old-age dependency ratio in t+20 and the old-age dependency ratio in t. See the Data Appendix for more details.

[27] In the appendix, we also add the lagged fiscal balance and the patterns stay the same.

[28] It is important to note that the aggregate results on the current account might not necessarily be identifiable at the sectoral level as these sectors covary between themselves.

2.4.2 Econometric Results

Table 2.2 presents our results for the estimation of equations (5) and (6). Column (1) shows the regression for the current account; in columns (2)-(5), we repeat the analysis for the net financial balance of each domestic sector. We find that the aggregate patterns are not shared across all sectors, and, in particular, we find a surprisingly limited role for the HH sector. Indeed, the traditional covariates of the current account explain a large share of the net balances of the GOV and the NFC sector, however, they explain relatively little of the HH and FC sectors balances. We also find some covariates have interesting offsetting and reinforcing effects between sectors. In terms of overall explanatory power, the set of fundamental covariates explain 57 percent of the current account balance. This result is reflected in the GOV and NFC sectors' balances, where fundamentals explain 49 and 37 percent of the respective variation. Next comes the HH sector with 25 percent and the FC with a mere 5 percent.

Regarding the current account regression column (1), GDP per capita, GDP growth, population growth, and the crisis and financial center dummies are all statistically significant. GDP per capita, which can be used as a proxy for the marginal product of capital, has its expected positive sign. GDP growth is significant and negative, in line with the literature. Population growth comes into play significantly and is associated with a deterioration of the current account as expected by the theory.[29]

Turning our attention to the net financial balance of the domestic sectors given by columns (2)-(5), we see that the conventional determinant of the current account can have offsetting or reinforcing effects across sectors. While it is unclear what standard theories would predict for some of the variables, one would expect a strong influence of the demographical covariates on the HH sector balance. However, out the three variables, only old-age dependency is significantly correlated with the HH sector balance. Moreover, it is positively associated with the HH balance. This is somewhat surprising, as it is included to capture the effect of retirees drawing down their savings. In contrast, old-age dependency is negatively correlated to the GOV and NFC sectors, in line with its predicted effect on the current account. The effects of population growth on the GOV and FC sector balances supplement each other and account for the strong overall negative association with the current account. The other demographic variables (the dependency ratio and aging speed) effectively cancel each other out in the aggregate. Aging speed is strongly associated with improvements in the net balance of the NFC sector, counterbalancing its negative co-movement with the GOV balance. The GOV balance is positively associated with GDP growth, whereas the NFC balance is on the

[29] Additionally, we break down the net lending of each sector into saving and investment flows (see Table 2.9 for the results).

contrary negatively associated with GDP growth, with the latter effect dominating on the current account. For GDP per capita, there is a positive association with the GOV balance (in line with its effect on the current account), however, it is associated with a deterioration of the HH sector balance. The lagged net international investment position has a significant influence on the HH sector balance, but not the others. Finally, the financial center dummy is associated with an improvement in the current account, the HH sector balance, and the NFC balance. However, it is associated with a deterioration of the GOV balance.

These patterns are robust to different lists of macroeconomic covariates. Using the same medium-term covariates of the current account as Chinn (2017) and applying our methodology, we find very similar results (see Table 2.12). In addition, if we include the lag of the fiscal balance (omitted for sake of comparability across sectors), Table 2.10 shows the patterns stay the same (with an increase in the fit for the GOV sector). In addition, if we use the IMF's list of covariates from its EBA-lite methodology (IMF, 2016), the results are very similar in terms of explanatory power across sectors (see Table 2.11). However, there are other ways one could assess current account balances through sectoral balances. For instance, one could explain each balance with a set of fundamentals specific to each sector (see IMF, 2017a). However, given our ultimate focus on deepening our understanding of the current account, we will limit our scope to the standard set of covariates of the current account in this paper.

The main lessons of these findings are that the aggregate results linking a set of fundamental to the medium-term movements in the current account do not translate across the domestic counterparts of the current account. In fact, there is a striking difference in overall explanatory power across sectors. These covariates explain the bulk of the variation of the NFC and GOV sector financial balances. However, it is not the case for the HH sector, the sector at the source of many traditional theoretical models and narratives of the current account. The association with the FC is particularly low, most likely due to its intermediation role. In addition, while we do find interesting offsetting dynamics between some sectors, it is not systematically the case that the HH sector offsets decisions of the NFC or the GOV sector. This evidence suggests households do not fully pierce the "corporate veil" and corroborates the failure of Ricardian equivalence. Finally, as mentioned in the introduction, these widely used empirical specifications have drawn from models that focus on HH sector or GOV sector dynamics. However, the results of this section suggest models that focus on NFC dynamics, as developed in Bacchetta and Benhima (2015b), might provide better insights.

2.5 Sectoral Balances and the External Adjustment since the Crisis

In this section, we take a fresh look at the patterns linking pre-crisis imbalances and the subsequent adjustment of the current account since the global financial crisis, drawing on Lane and Milesi-Ferretti (2012, 2015). However, here we study these linkages through the lens of domestic sector balances.

The key insights from this section are that the lion's share of the adjustment of the current account in the aftermath of the crisis can be accounted for by lower pre-crisis NFC net balances and larger post-crisis NFC adjustments. There is no systematic relationship for the other sectors. The post-crisis improvements in the NFC are consistent with the narrative of an external adjustment operating primarily through decreasing investment as opposed to increasing saving. Finally, these patterns are even more pronounced in countries running pre-crisis current account deficits in excess of the values indicated by their underlying fundamentals (i.e. negative "gap" countries). Because we are looking at a more recent time period, we can extend our sample of countries.[30]

We proceed in three steps. First, we examine how pre-crisis sectoral balances can account for the adjustment process of the current account in the aftermath of the crisis. Second, we study the post-crisis adjustment channels. In other words which sector adjusted as a counterpart of the current account rebalancing. Finally, after defining the pre-crisis current account gap as deviations of the observed current account from the balance explained by a set of fundamental, we show that there is striking cross-country variation in both pre and post-crisis dynamics of the domestic sectors depending on whether the country was running an excessive current account balance or not in the run-up to the crisis. We focus on predetermined variables in our regressions to limit the endogeneity issues in interpreting our results. Our approach does not allow us to take a stand on the underlying causal mechanisms, but to identify through which sector the aggregate adjustment of the current account took place.

As a first glance at the data, Figure 2.5 shows the bivariate relationship between the adjustment of the current account since 2008 (i.e. the change between the average current account balance between 2005-2008 and its 2015 value) and the pre-crisis average balance between 2005-2008 for the current account and each domestic sector.[31] We see that the correlation is clearly negative and very strong between the post-crisis adjustment and the pre-crisis current account balance. This negative association is reflected in the pre-crisis NFC and GOV

[30] See Appendix B for the list of countries.

[31] We omit the extreme cases of Iceland, Norway, and Bulgaria for the following analysis.

balances. Countries with the largest pre-crisis net deficits in these sectors tend to have larger current account adjustments in the aftermath of the crisis. The relationship is a lot weaker for the HH and FC sectors.

Next, we look at this relationship while taking into account the initial level of the NIIP. Indeed, following Lane and Milesi-Ferretti (2015), increased pressure to adjust could have been placed on countries with high levels of outstanding net international liabilities. In order to control for this, first, we perform the simple following cross-sectional regression:

$$\Delta CA_{i,0508-15} = \alpha + \beta CA_{i,0508} + \gamma NIIP_{i,0407} + \epsilon_i \tag{2.7}$$

$\Delta CA_{i,0508-15}$ is the adjustment of the current account balance, $CA_{i,0508}$ is the average current account balance the 2005-2008 period, and $NIIP_{i,0407}$ is the average stock of net international assets over the 2004-2007 period. The regression results are shown in Table 2.3, column (1). As expected, a larger pre-crisis current account deficit is associated with a larger post-crisis adjustment.

In order to see how this aggregate result is distributed across domestic sectors, we replace the pre-crisis current account balance with the domestic sectoral net balances, denoting $NFB^s_{i,0508}$ the average balance of sector (s) (HH, GOV, NFC, and FC):

$$\Delta CA_{i,0508-15} = \alpha + \sum_s \beta^s NFB^s_{i,0508} + \gamma NIIP_{i,0407} + \epsilon_i \tag{2.8}$$

It is the pre-crisis net financial balance of the NFC sector that is most significantly correlated with the current account adjustment (column (2)). The HH and GOV sectors are also negatively associated with the adjustment but at lower significance levels.

Pushing further, we ask if conditional on the pre-crisis current account imbalance, do sector balances give any additional information on the post-crisis adjustment of the current account? Following Lane and Milesi-Ferretti (2015), we derive a measure of current account imbalances, called the current account gap, as the difference between the observed current account from the balance explained by a set of fundamentals in the pre-crisis period.[32] To see this, we run the following cross-sectional regression:

$$\Delta CA_{i,0508-15} = \alpha + \beta NFB^s_{i,0508} + \delta GAP_{i,0508} + \gamma NIIP_{i,0407} + \epsilon_i \tag{2.9}$$

[32]To derive the current account balance explained by fundamentals, we run the regression $CA = CA(X_{it})$ over the 1970-2015 period with 4-year non-overlapping averages. X_{it} corresponds to the controls used in table 2.2. The current account gap is then computed as follows: $CA^{gap} = CA^{observed} - CA^{predicted}$. The results of the regression are in line with Lane and Milesi-Ferretti (2012) and are available upon request.

The results of this regression are column (4)-(7). They show that only the net pre-crisis balance of the NFC sector is a robust predictor of the post-crisis external adjustment, even controlling for the pre-crisis current account gap. Given the gap, larger net deficits in the NFC sector are associated with a larger correction in the current account balance.[33]

In order to see through which channels the adjustment of the current account took place, we look at the relationship between the current account gap and the subsequent adjustment of the domestic sectors since the crisis (i.e. the change between the average sector balance between 2005-2008 and its 2015 value), by running the following regression:[34]

$$\Delta NFB^{s}_{i,0508-15} = \alpha + \beta GAP_{i,0508} + \gamma NIIP_{i,0407} + \epsilon_i \tag{2.10}$$

Column (1) of Table 2.4 shows that the pre-crisis gap accounts for a large portion of the current account adjustment since the crisis. This aggregate result is only reflected in the NFC sector, column (4), where the pre-crisis current account gap explains a similar share of the post-crisis adjustment of the NFC sector. Countries with more negative gaps have experienced a larger adjustment in their current account and NFC balance. This is consistent with the narrative of an external adjustment achieved mainly through decreasing investment as opposed to decreasing consumption.[35]

Next, we examine the striking difference in patterns between countries with positive or negative pre-crisis current account gap values.[36] Indeed, a symmetric adjustment between positive and negative gap countries seems unlikely, as sustainability constraints in excess deficit countries do not necessarily have a counterpart in excess surplus countries. Figure 2.6 shows the stark contrast in average net flows in the pre-crisis period and post-crisis adjustments when we split the sample.[37] In relation to the pre-crisis flows, the large negative average current account deficit was reflected in negative domestic flows (except for the FC sector), most notably for NFC and GOV sectors. Moreover, the post-crisis adjustment in all sectors was larger in negative current account gap countries, in particular for the NFC sector with an average

[33] Moreover, there was also a large within sector adjustment since the crisis, with all sectors undergoing a correction of their net lending balance (see Figure 2.14). The adjustment of the government sector was the strongest, unsurprisingly followed by the NFC sector.

[34] One could also compute sectoral gaps. However, given our limited timeframe and our primary focus on the current account, we do not perform those regressions.

[35] Additionally, Figure 2.15 shows the contemporaneous post-crisis adjustment of the current account and the sector balances. Clearly, we cannot infer any causal link as the variables are jointly determined. However, we do see that there is a strong association between the current account adjustment and the NFC and GOV sectors. The relationship is less clear for the HH and FC sectors.

[36] After taking the difference between the actual and predicted pre-crisis current account, we find sub-samples of countries with positive and negative gaps, see Appendix B for the country list.

[37] We drop Iceland as the extreme nature of the build-up of its financial sector skews the cross-country average.

adjustment of over 6 percent of GDP in negative gap countries against under 4 percent in positive gap countries.

In summary, the large adjustment in current account balances seen in the aftermath of the global financial crisis is largely accounted for by NFC sector net flows, consistent with the narrative of declines in investment and increases in corporate saving. These patterns have striking differences between countries with pre-crisis positive or negative current account gaps (measured as the difference between the observed current account and the level predicted by fundamentals), with adjustments in every sector substantially larger in the negative gap countries. In both sets of countries, the bulk of the adjustment occurred in the NFC sector, however, the HH sector also increased its net lending balance in negative gap countries. These findings are consistent with the expenditure reduction explanation of current account reversals, with most of the adjustment occurring on the investment side (mainly due to the NFC sector) as opposed to the consumption side (mainly due to the HH sector).

2.6 Sectoral Balances and Large External Imbalances

In our preceding analysis, we looked at the domestic counterpart of current account covariates and adjustments. In this section, we will examine periods of large and persistent capital inflows (or current account deficits) and outflows (or current account surpluses) and document the sectoral patterns that lie behind them.[38] Ultimately, the key takeaway is that there is very little difference between large and persistent surplus and deficit episodes when it comes to the HH sector. There are stark differences for the GOV, NFC, and FC sectors. This allows us to gain insights for a comprehensive assessment of external sustainability, by highlighting which sector accumulates wealth or builds-up liabilities, but also by determining if imbalances are dominated by private flows or public flows.[39]

Simply defining large current imbalances as balances over 3 percent of GDP in absolute value in one year, a first glance at the data shows that HH balances show no differential patterns between large surpluses and deficits.[40] Table 2.5 shows that the average net financial balance during years with current account imbalances, varies from surplus to deficits from 0.6 to -3.8

[38]It is important to note that our sample of countries excludes most Asian emerging markets, who ran large current account surpluses during this period. In particular, the accumulation of net government assets might have been larger than in advanced economies. In addition, Bacchetta and Benhima (2015b) show this period coincided with an increase in their corporate saving.

[39]In a similar manner to Forbes and Warnock (2014) determine equity and debt-led episodes.

[40]This threshold is commonly used in policy circles as a rule of thumb for a "large" imbalance, see for instance IMF (2017a). Similar results are found with 2 percent and 4 percent thresholds.

for the GOV, 0.5 to -4.9 for the NFC, 1.3 to -4.8 percent of GDP for the FC sector. However, it only varies from 3.2 to 2 percent of GDP for the HH sector.

In order to capture persistent episodes of imbalances, we combine imbalances of a least five consecutive years into episodes. Tables 2.6 and 2.7 show the full list of the episodes.[41] Figure 2.7 shows the median contribution of sector flows to the change in current account balance over an 11-year window (year 0 marks the beginning of the episode). The HH sector accumulated similar financial surplus between 22 and 30 percent of GDP during large deficits and surpluses respectively. In contrast, flows in the other domestic sectors differed considerably during surplus and deficit episodes. The NFC and FC sectors accumulated net surpluses of under 20 percent of GDP during surplus periods, whereas during deficits, the FC sector has had a roughly balanced flows and the NFC sector accumulated net deficits around -60 percent of GDP. The GOV sector has accumulated a small net deficit during surplus episodes and net deficits of around -60 percent of GDP during deficits.[42]

However, when we turn to the change in stock positions during these episodes, the story changes. These positions consist of the cumulated flows and the corresponding change in the value of the net financial position. Figure 2.8 shows the median change in net financial wealth during these same episodes. During deficit episodes, the HH sector has surprisingly accumulated roughly no net financial wealth in contrast to cumulated flows of around 20 percent of GDP. This is due to negative valuation adjustments over the period. The external sector accumulated liabilities of around 50 percent of GDP, with the NFC and GOV sectors contributing equally. During surplus episodes, the accumulation of foreign wealth followed an accumulation of wealth in the GOV and HH sectors of around 20 percent of GDP, with the FC's position not changing (reflecting some negative valuation effects). The NFC sector, however, has experienced negative wealth changes during the episode. However, this may reflect the increasing price of equity shares on the liability side of their balance sheet.[43][44]

Going further into the country by country differences, Table 2.6 and 2.7 show the adjustment of the main sectors during surplus and deficit episodes. We see that even within current account episodes, there are considerable differences in their sectoral decomposition. In the spirit of Forbes and Warnock (2014) we classify the episodes simply in two categories: publicly-led

[41] The sudden stop literature defines episodes as deviations from long-run trends, see Benigno, Converse, and Fornaro (2015) for instance. The rationale is that if a country can sustain current account deficits of x percent, then it is the deviations from these trends that matter. However, this is not this paper's objective. We look at what happens to sector balances during large and persistent deficits and surpluses.

[42] Figure 2.16 and Figure 2.17 show the individual sectoral flows with error bands.

[43] Figure 2.18 and Figure 2.19 show the individual sectoral positions with error bands.

[44] The outstanding equity of a corporation is treated as a liability in the national accounts. In times of high stock price appreciation, this can lead to decreasing net financial wealth of the NFC sector. We can derive a modified NFP of the NFC sector by excluding the outstanding equity at market prices to get a measure of wealth which ultimately belongs to the shareholders.

episodes (G) and privately-led episodes (P). We do this by looking at the sum of net balances for the private sector (adding HH, NFC, and FC) over the period of time the episode lasts, comparing it to the public sector net balance and assigning the episode to the sector with the largest flow. Table 2.6 shows that in current account deficit episodes, the public sector adjustment is larger in 14 out of the 19 episodes and the private sector in the remaining 5 cases. Interestingly, Greece and Portugal both had public (G) current account deficit episodes while Estonia had a private current account episode for instance, based on this methodology. However, for the current account surplus episodes, most episodes were associated with larger flows in the private sector, with 9 of the 11 episodes dominated by private sector flows and 2 were public sector driven (Table 2.7). For instance, for most of the sample, the Netherlands and Norway had current account surplus episodes, however private flows dominated in the former and public flows in the latter.

In sum, analyzing domestic balances during large and persistent current account episodes gives us insight into which sector has accumulated net wealth or net liabilities. In terms of flows, the HH sector balance is relatively similar in both types of episodes, with most of the accumulation of wealth during surplus episodes going to the NFC and FC sector and most of the build-up in liabilities during deficit episodes is in the GOV and NFC sectors. Interestingly, even within current account episodes, the domestic flows behind the episode can be very different. In terms of magnitude, cumulated private flows dominate public flows during surplus episodes in most countries, whereas public flows are larger during deficit episodes.

2.7 Concluding Remarks

In this paper, we have sought to better understand global imbalances and external adjustments in advanced countries by analyzing their domestic sectoral counterpart.

Our main findings shed light on a rather limited role for the HH sector in explaining these trends, in contrast to the NFC and GOV sectors. These findings are somewhat at odds with the widespread narrative that the HH sector plays a central role in current account dynamics. These results hold for: (i) the contribution of domestic balances to current account imbalances; (ii) the co-movement with a widely-used set of medium-run covariates of the current account; (iii) the external adjustment in the aftermath of the global financial crisis; and (iv) the dynamics of domestic flows during large and persistent current account imbalance episodes.

Our analysis shows there are systematic differences in the patterns of the domestic counterpart of external balances in current account surplus and deficit countries. This is largely due to

the NFC sector net surplus in surplus countries in the past few decades and net deficits of the GOV sector in deficit countries since the global financial crisis. HH sector dynamics have been relatively similar in both sets of countries, in contrast to predictions from a large class of models of global imbalances.

Moreover, there is a striking difference between domestic balances in the overall explanatory power of the standard set of macroeconomic fundamentals commonly used as covariates of the current account. These variables explain the bulk of the variation of the NFC and GOV sector financial balances. This is not the case for the HH sector, at the source of many traditional theoretical models and narratives of the current account. Moreover, these fundamentals can sometimes have some interesting offsetting effects between domestic sectors. However, there is no evidence of the HH sector perfectly offsetting changes in the NFC or GOV sector, pointing to distortions and the presence of a "corporate veil" or non-Ricardian behavior.

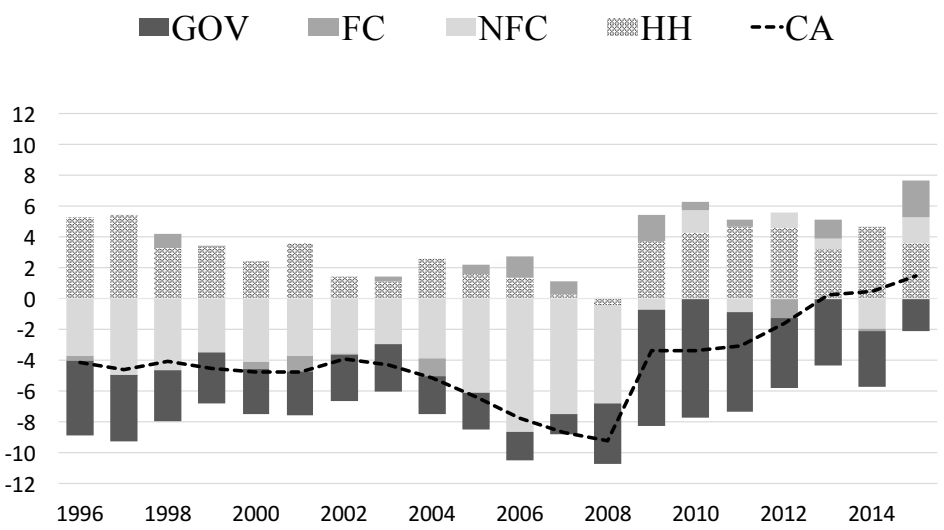
Similarly, the NFC sector accounts for most of the correlation patterns between prior current account balances and the resulting adjustment process, with the HH sector playing a very limited role once again. These patterns are driven by countries with negative pre-crisis current account gaps (measured as the difference between the observed current account and the level predicted by fundamentals), with adjustments substantially larger for every sector in these countries. These findings are consistent with an expenditure reduction explanation of current account reversals, with most of the adjustment occurring on the investment side (mainly due to the NFC sector) as opposed to the consumption side (mainly due to the HH sector).

Finally, when we analyze domestic balances during episodes of capital inflows and outflows, we find that in terms of flows, the HH sector balance is relatively similar in both types of episodes, with most of the accumulation of wealth during surplus episodes going to the NFC and FC sector and most of the build-up in liabilities during deficit episodes in the GOV and NFC sectors. In addition, private flows dominate public flows during surplus episodes in most countries, whereas public flows are larger during deficit episodes.

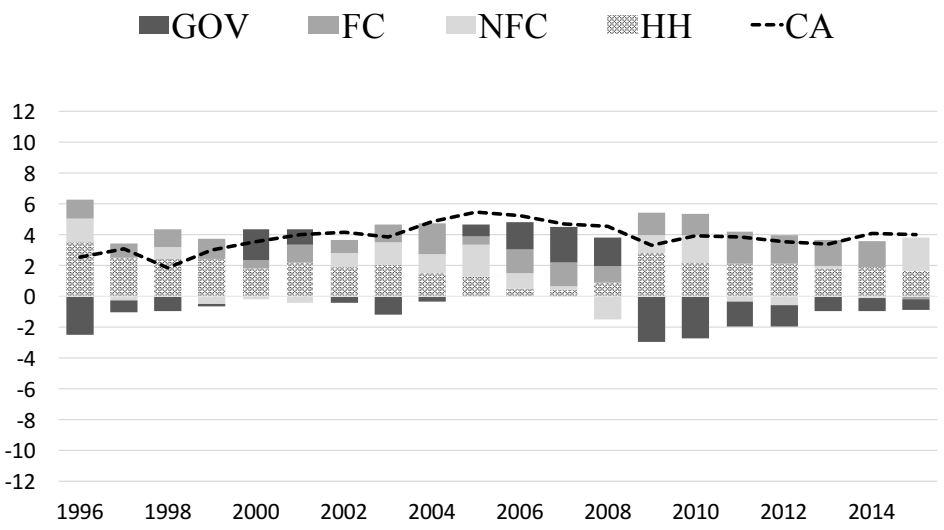
The results suggest that there are valuable insights to be obtained from integrating domestic sectoral balance into the analysis of global imbalances. We argue that models trying to understand external imbalances and adjustments should take into account the diverging patterns between the NFC and HH sectors saving and investment dynamics. On the policy side, tackling potential distortions on in the NFC sector, with regards to its funding mechanisms, for instance, might be more likely to generate balanced current accounts than policies aimed at the HH sector. However, our paper still leaves open a series of important questions. In particular, there is little consensus on the underlying sources of the shift of the NFC sector towards becoming a net lender of funds and the sector's relationship with the rest of the world. This raises interesting challenges for future research.

Figure 2.1: Sectoral Contribution to Current Account Balances

(a) Deficit Countries

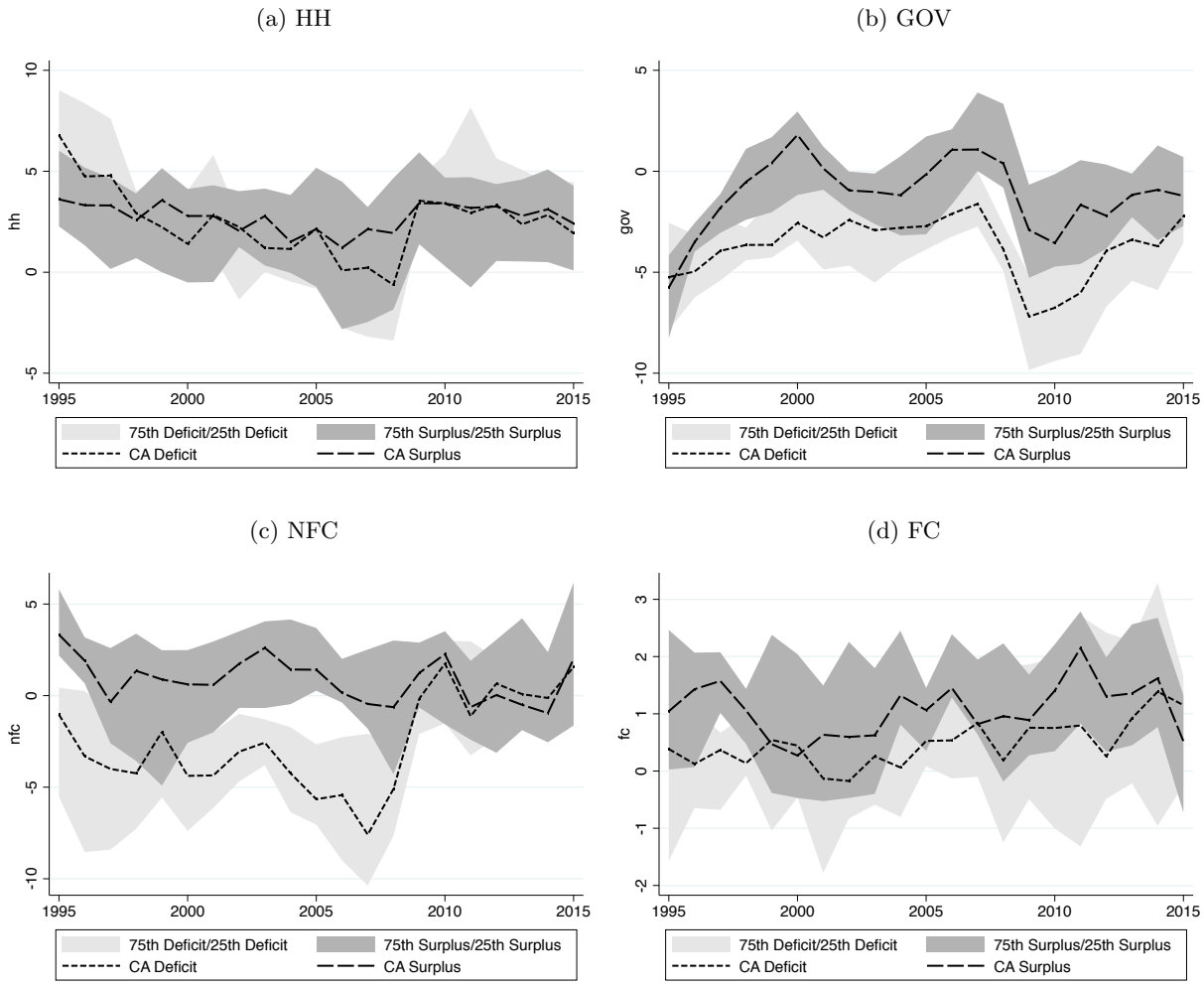


(b) Surplus Countries



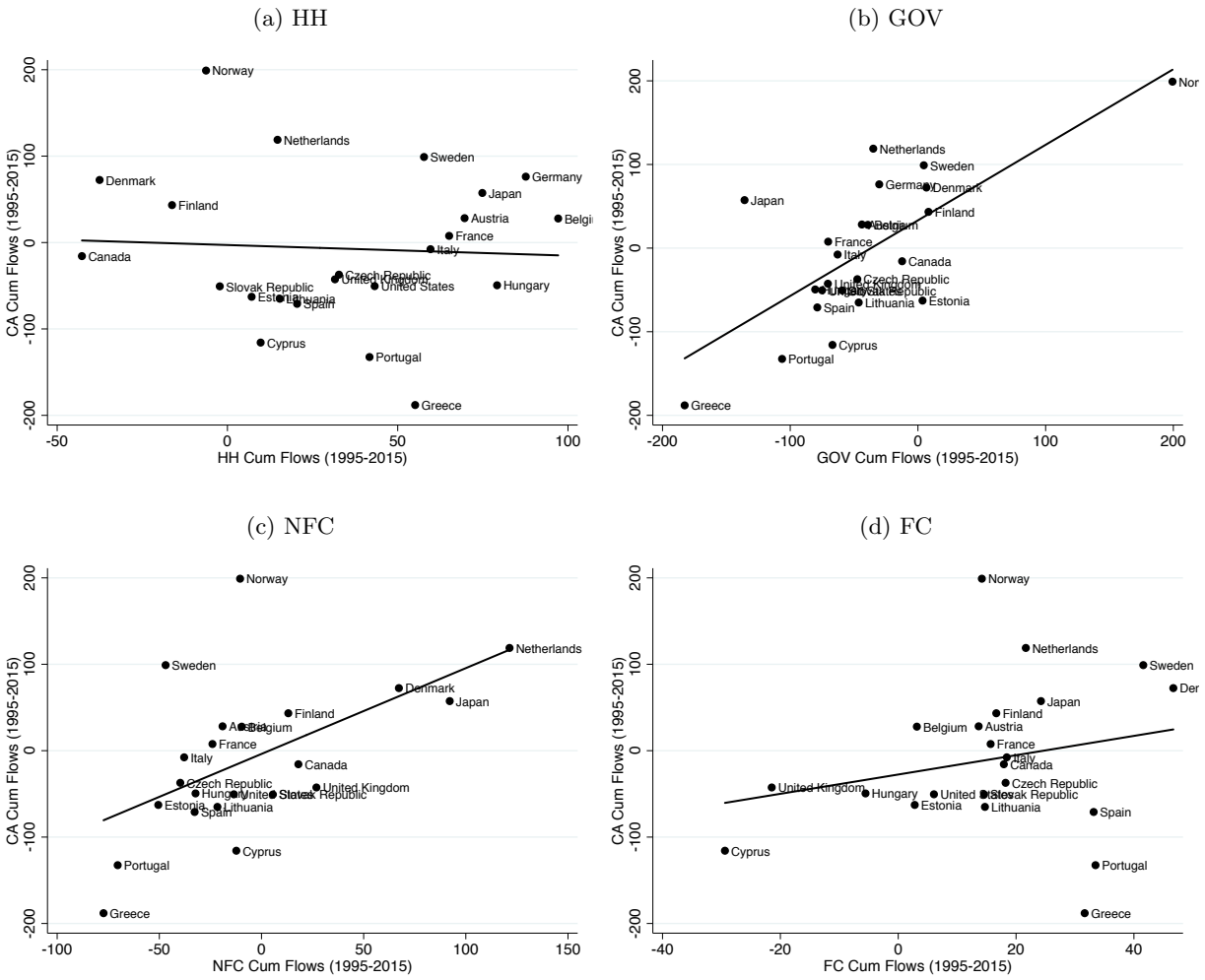
Note: Average values of sectoral net financial balances and the current account balance, weighted by country GDP. GOV: Government, FC: Financial Corporations, NFC: Non-Financial Corporations, HH: Households, CA: Current Account. Current account surplus countries are: France, Belgium, Sweden, the Netherlands, Canada, Denmark, Norway, Germany, Finland, Austria, and Japan. Current account deficit countries are: Portugal, Cyprus, the United Kingdom, Lithuania, Spain, Greece, Czech Republic, Hungary, the United States, Slovak Republic, Italy, and Estonia.

Figure 2.2: Domestic Sectoral Flows



Note: In percent of GDP. Sectoral flows depending on if the economy was running a current account deficit or surplus on the eve of the crisis in 2007. Median values with error bands at the 25th and 75th percentile. GOV: Government, FC: Financial Corporations, NFC: Non-Financial Corporations, HH: Households.

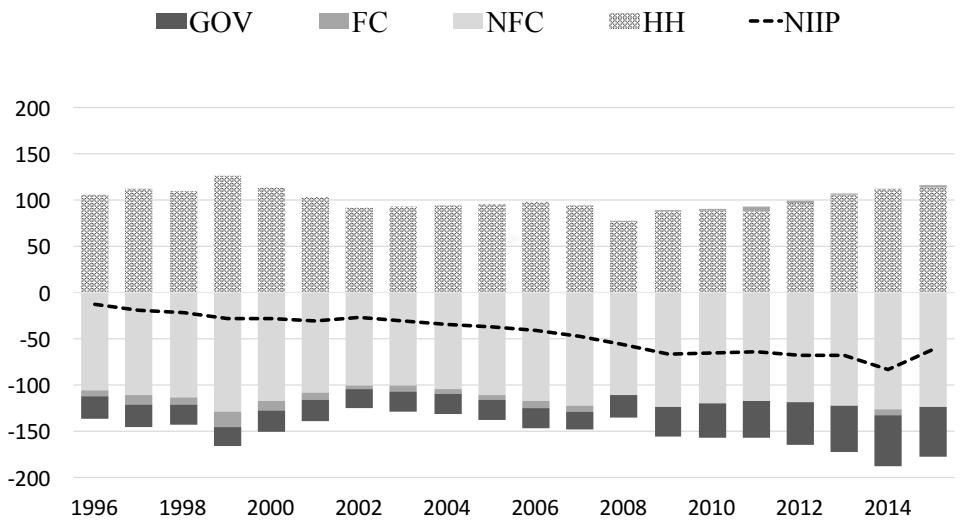
Figure 2.3: Cumulative Flows: Current Account and Across Domestic Sectors



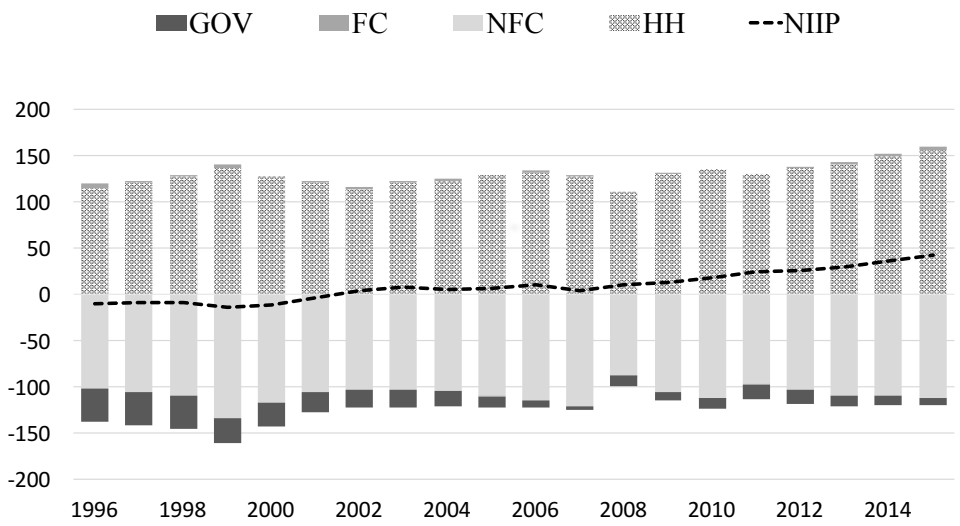
Note: HH: Households, NFC: Non-Financial Corporations, GOV: Government, FC: Financial Corporations. Cumulated net financial flows of each sector between 1995 and 2015 against the cumulated current account balance. In percent of 2015 GDP.

Figure 2.4: Sectoral Contribution to Net International Investment Positions

(a) Deficit Countries



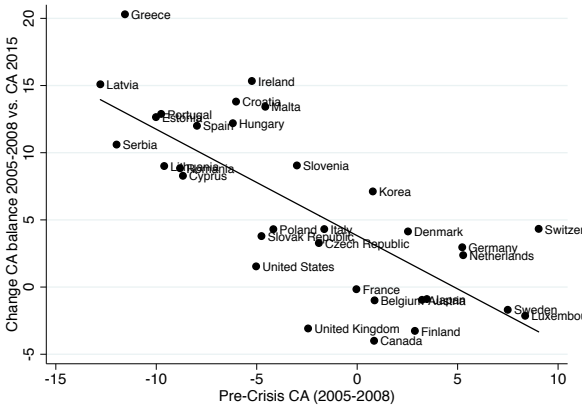
(b) Surplus Countries



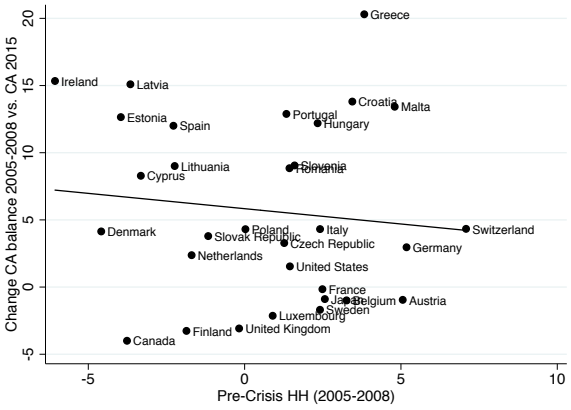
Note: Average values of sectoral net financial positions and the net international investment position, weighted by country GDP. GOV: Government, FC: Financial Corporations, NFC: Non-Financial Corporations, HH: Households, NIIP: Net International Investment Position. Current account surplus countries are: France, Belgium, Sweden, the Netherlands, Canada, Denmark, Norway, Germany, Finland, Austria, and Japan. Current account deficit countries are: Portugal, Cyprus, the United Kingdom, Lithuania, Spain, Greece, Czech Republic, Hungary, the United States, Slovak Republic, Italy, and Estonia.

Figure 2.5: Adjustment Process of the Current Account and Previous Imbalances

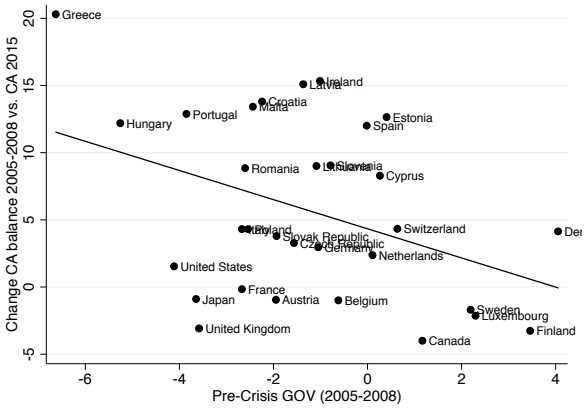
(a) CA



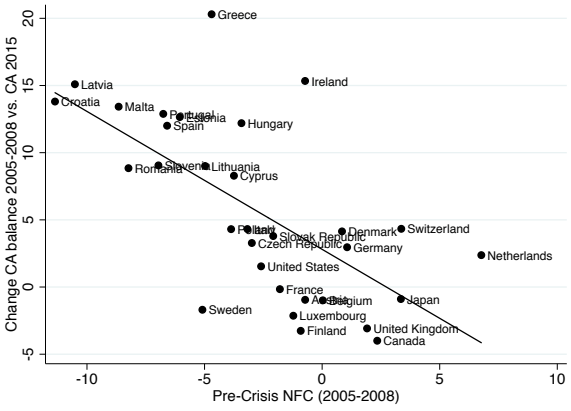
(b) HH



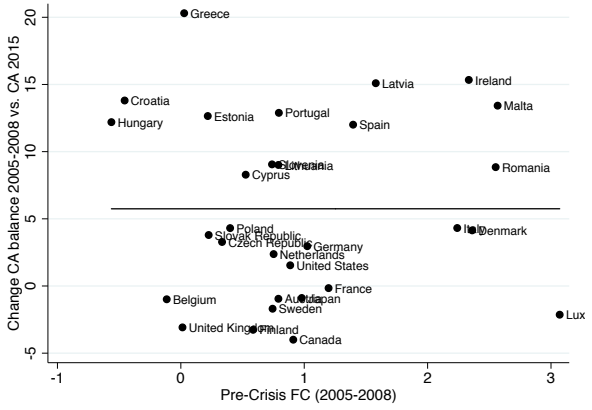
(c) GOV



(d) NFC



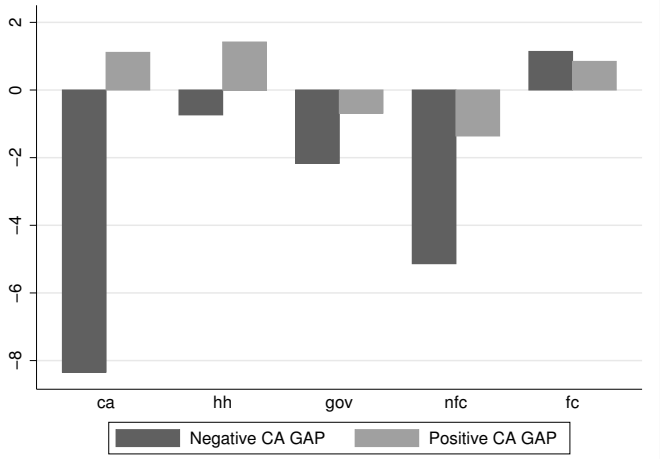
(e) FC



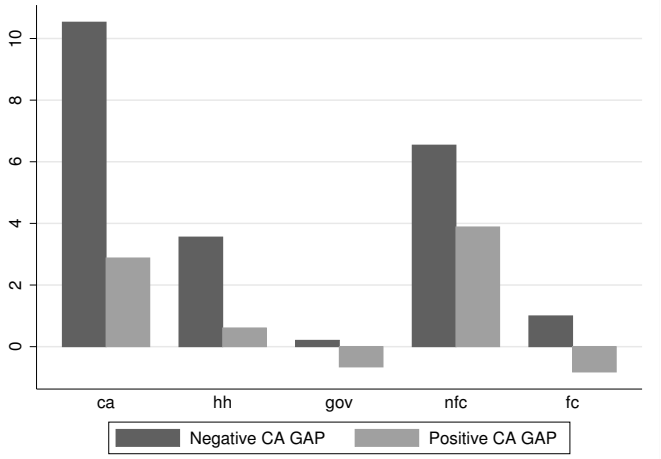
Note: CA: Current Account, HH: Households, NFC: Non-Financial Corporations, GOV: Government, FC: Financial Corporations. Relationship between the adjustment of the current account since 2008 (i.e. the change between the average current account balance between 2005-2008 average and its 2015 value) and the pre-crisis imbalance between 2005-2008 for the current account and each sectoral balance. In percent of 2015 GDP.

Figure 2.6: Average Adjustment Conditional on Pre-Crisis Current Account Gap

(a) Pre-Crisis Flows



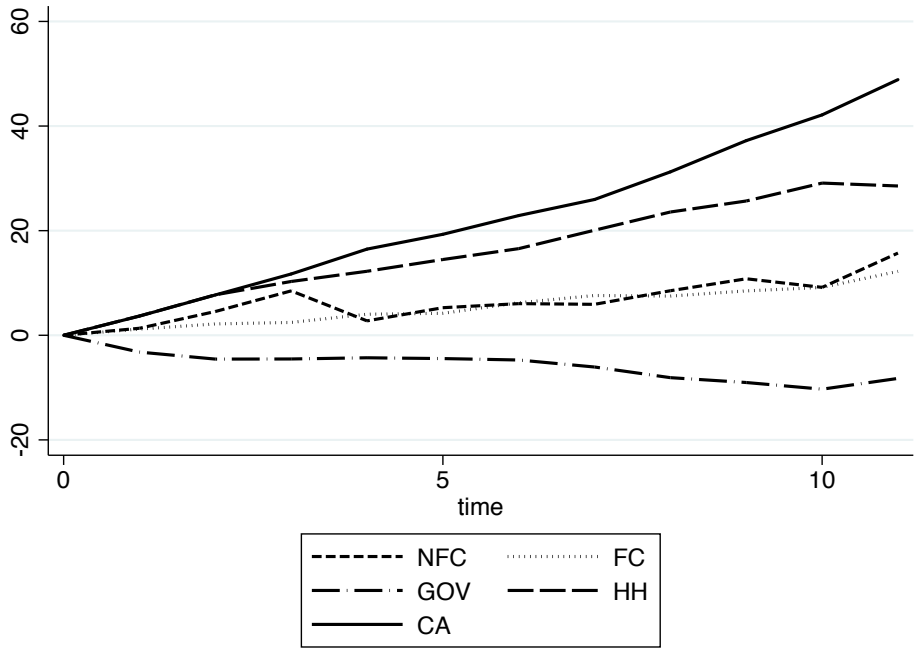
(b) Post-Crisis Flows



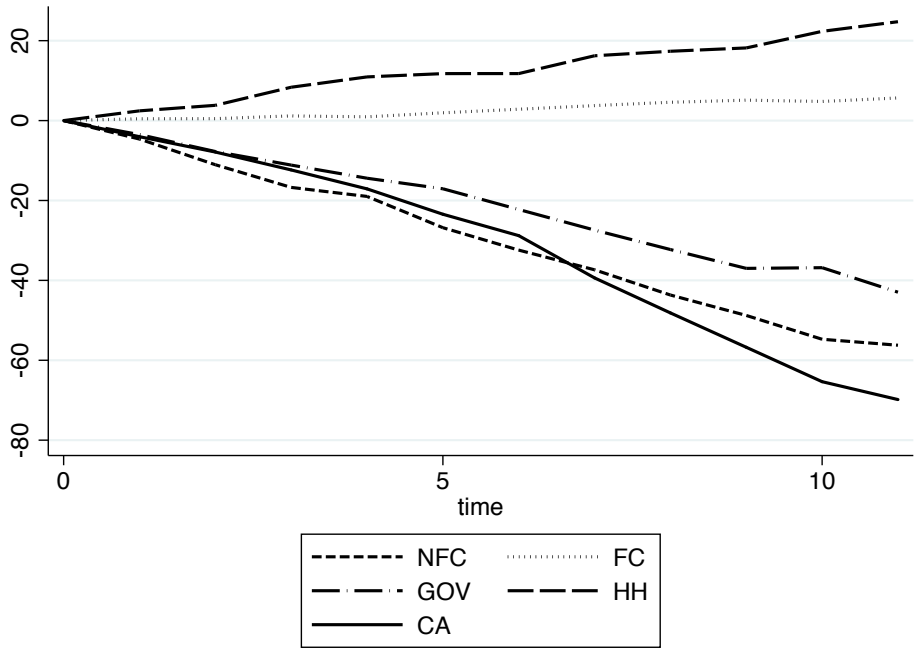
Note: Figure (a) shows the average pre-crisis imbalance between 2005-2008 for the current account and each sectoral balance in percent of 2015 GDP. The countries are split into negative and positive pre-crisis current account gap. Figure (b) shows the average adjustment of the current account since 2008 (i.e. the change between the average current account balance between 2005-2008 and its 2015 value) in percent of 2015 GDP. The negative gap countries are: Bulgaria, Latvia, Greece, Ireland, the United States, Lithuania, Romania, Portugal, Estonia, Spain, Malta, Cyprus, and the United Kingdom. The positive gap countries are: Slovak Republic, Luxembourg, Croatia, Slovenia, Hungary, Italy, Belgium, France, Poland, Denmark, Czech Republic, Canada, Finland, Austria, Korea, Rep., the Netherlands, Switzerland, Germany, Japan, Norway, and Sweden.

Figure 2.7: Large and Persistent Current Account Episodes: Cumulated Flows

(a) Current Account Surplus



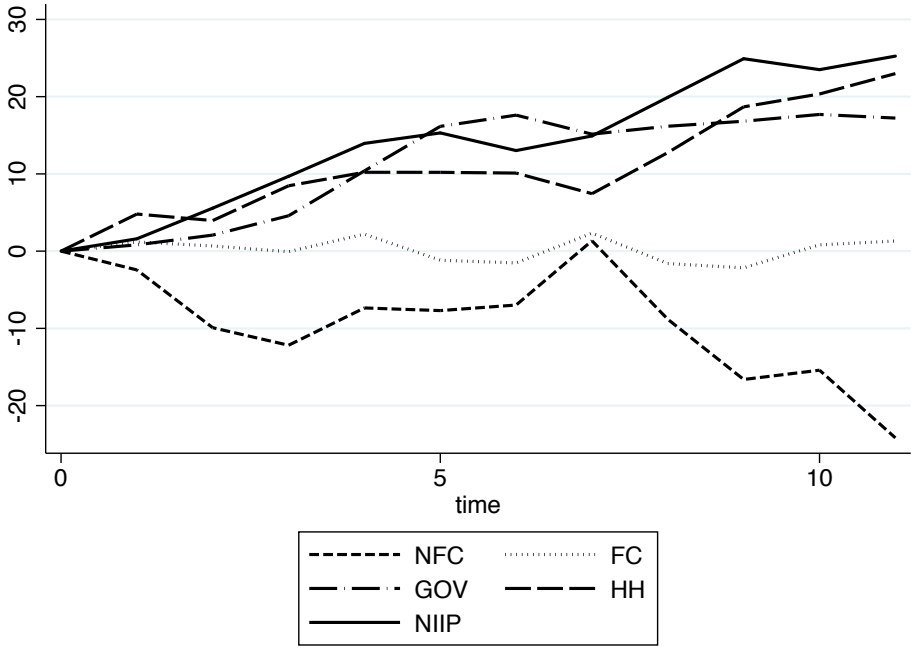
(b) Current Account Deficit



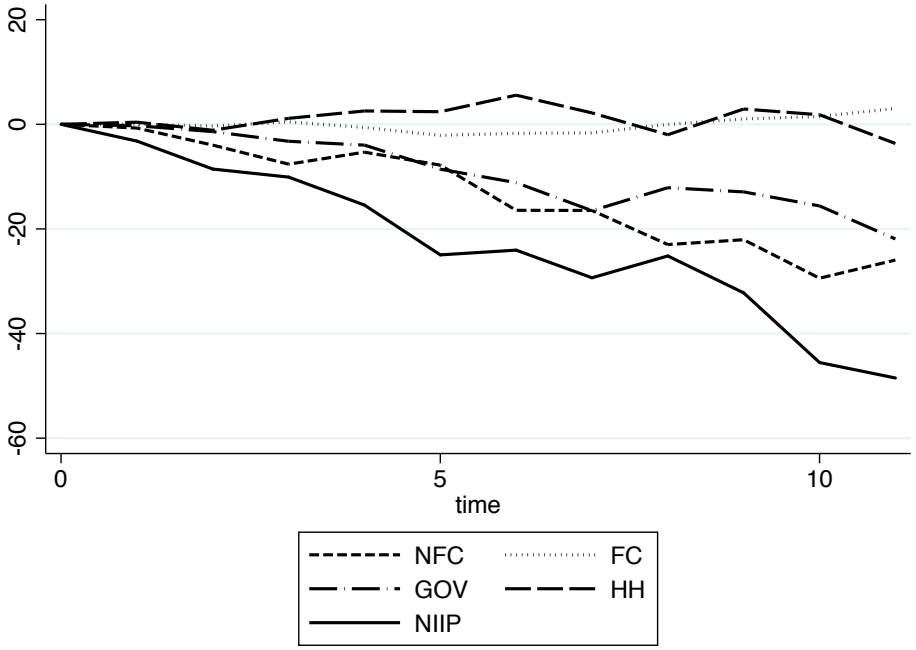
Note: This figure plots the change relative to the initial value of the cumulated sectoral and external flows during episodes of large and persistent imbalances. In percent of GDP. CA: Current Account, HH: Households, NFC: Non-Financial Corporations, GOV: Government, FC: Financial Corporations. Large surplus and deficit episodes correspond to periods of imbalances larger or equal to 3 percent of GDP for at least 5 consecutive years.

Figure 2.8: Large and Persistent Current Account Episodes: Changes in Wealth

(a) Current Account Surplus



(b) Current Account Deficit



Note: This figure plots the change relative to the initial value of the sectoral and external position during episodes of large and persistent current account imbalances. In percent of GDP. NIIP: Net International Investment Position, HH: Households, NFC: Non-Financial Corporations, GOV: Government, FC: Financial Corporations. Large surplus and deficit episodes correspond to periods of imbalances larger or equal to 3 percent of GDP for at least 5 consecutive years.

Table 2.1: Net Sectoral Financial Positions

	NIIP	HH	GOV	NFC	FC
			2002		
All	-8.3	178.1	-51.3	-113.8	-8.6
Surplus	11.6	149.2	-50.6	-89.1	-0.2
Deficit	-21.9	197.9	-51.8	-130.8	-14.3
			2007		
All	-5.5	196.2	-48.6	-137.5	-5.0
Surplus	14.7	157.6	-41.9	-104.5	0.8
Deficit	-19.7	223.2	-53.3	-160.4	-9.0
			2015		
All	-12.6	242.1	-80.7	-148.8	-1.3
Surplus	55.7	154.5	-35.9	-95.8	8.2
Deficit	-40.7	278.3	-99.1	-170.7	-5.2

Note: Average sectoral net positions for the whole sample, the current account surplus countries sub-sample and the current account deficit countries sub-sample. Net positions are calculated as total financial assets minus financial liabilities in percent of GDP. HH: Households, NFC: Non-Financial Corporations, FC: Financial Corporations, GOV: Government, NIIP: Net International Investment Position.

Table 2.2: The Covariates of the Current Account Balance

	(1) CA	(2) HH	(3) GOV	(4) NFC	(5) FC
GDP Growth	-0.177**	-0.033	0.169**	-0.260***	-0.056
	(0.080)	(0.066)	(0.069)	(0.063)	(0.042)
Population growth	-2.364***	0.076	-1.351***	-0.482	-0.918***
	(0.630)	(0.477)	(0.454)	(0.570)	(0.318)
GDP per capita	0.254***	-0.057***	0.223***	0.044	0.028*
	(0.033)	(0.020)	(0.031)	(0.026)	(0.016)
Dependency ratio (old)	-0.102	0.182***	-0.122**	-0.187***	-0.026
	(0.068)	(0.047)	(0.061)	(0.065)	(0.047)
Aging Speed	0.008	-0.038	-0.225***	0.183***	0.049
	(0.064)	(0.041)	(0.056)	(0.058)	(0.035)
Lagged NIIP	0.011	0.014**	-0.006	0.007	-0.004
	(0.011)	(0.006)	(0.008)	(0.009)	(0.008)
Global Financial Crisis	-0.056***	-0.026**	-0.001	-0.019	-0.005
	(0.012)	(0.010)	(0.009)	(0.012)	(0.007)
Financial Center	0.015*	0.012***	-0.013**	0.018***	-0.002
	(0.008)	(0.004)	(0.005)	(0.007)	(0.005)
Observations	156	156	156	156	156
Adjusted R^2	0.57	0.25	0.49	0.37	0.05

Panel OLS estimation over the 1995-2015 period with 3 year non-overlapping averages and robust standards errors. Time fixed effects are included. The dependent variables are the current account balance (CA) and the net financial balances of the main domestic sectors (HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations), in percent of GDP. See text for more information of the control variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.3: Adjustment Process of the Current Account and Previous Imbalances

	(1) $\Delta CA_{0508-15}$	(2) $\Delta CA_{0508-15}$	(3) $\Delta CA_{0508-15}$	(4) $\Delta CA_{0508-15}$	(5) $\Delta CA_{0508-15}$	(6) $\Delta CA_{0508-15}$	(7) $\Delta CA_{0508-15}$
CA_{0508}	-0.862***						
	(0.140)						
GAP_{0508}			-0.284***	-0.316***	-0.268***	-0.218**	-0.251***
			(0.067)	(0.075)	(0.064)	(0.082)	(0.076)
HH_{0508}		-0.720*		0.436			
		(0.356)		(0.291)			
GOV_{0508}		-1.199**			-0.356		
		(0.455)			(0.400)		
NFC_{0508}		-0.842***				-0.581**	
		(0.259)				(0.265)	
FC_{0508}		1.014					0.514
		(0.878)					(1.137)
$NIIP_{0407}$	0.009	-0.046	-0.036	-0.043	-0.030	-0.011	-0.088**
	(0.037)	(0.038)	(0.037)	(0.032)	(0.038)	(0.037)	(0.039)
Observations	31	30	31	31	31	31	30
Adjusted R^2	0.55	0.60	0.47	0.49	0.46	0.54	0.53

Cross-section estimation with robust standards errors. $\Delta CA_{0508-15}$ is the adjustment of the current account in the aftermath of the crisis (i.e. the change between the average current account balance between 2005-2008 and its 2015 value). GAP is the pre-crisis current account gap. HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations. Sector balances are average flows between 2005-2008. We drop the following most extreme cases: Iceland, Norway and Bulgaria. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.4: Sectoral Adjustments and Pre-Crisis Current Account Gap

	(1) $\Delta CA_{0508-15}$	(2) $\Delta HH_{0508-15}$	(3) $\Delta GOV_{0508-15}$	(4) $\Delta NFC_{0508-15}$	(5) $\Delta FC_{0508-15}$
GAP_{0508}	-0.284***	-0.102	-0.028	-0.107**	-0.019
	(0.067)	(0.062)	(0.037)	(0.049)	(0.096)
$NIIP_{0407}$	-0.036	0.004	-0.012	-0.058**	-0.015
	(0.037)	(0.021)	(0.016)	(0.026)	(0.065)
Observations	31	31	31	31	30
Adjusted R^2	0.47	0.07	0.00	0.31	0.00

Cross-sectional regression with robust standards errors. The dependent variable are the post-crisis adjustment of the Current Account (CA), and the net financial balances of the domestic sectors (i.e. the change between the average balance between 2005-2008 and its 2015 value). Households (HH), Government (GOV), Non-Financial Corporations (NFC), Financial Corporations (FC). GAP is the pre-crisis current account gap. We drop the following most extreme cases: Iceland, Norway and Bulgaria.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.5: Average Net Sectoral Balance During Current Account Imbalances

	CA	HH	GOV	NFC	FC
Surplus	7.0	3.2	0.6	0.5	1.3
Deficit	-7.0	2.0	-3.8	-4.9	-4.8
No Episode	-0.2	3.0	-3.2	-0.2	0.8

Note: Average net sectoral balance during current account episodes. In percent of GDP. Surplus corresponds to periods where the current account is in surplus of 3 percent or more of GDP. Deficit periods correspond to periods of deficits larger or equal to -3 percent of GDP. No Episode signifies the current account does not fall into the two categories above.

Table 2.6: Persistent Current Account Deficits Episodes

				Private				Public	Foreign	
	Start	End	N	HH	NFC	FC	Total	GOV	CA	Type
United States	1998	2015	18	52.9	-17.2	7.6	43.3	-95.4	-63.8	G
United Kingdom	2006	2015	10	14.9	22.5	-5.1	32.4	-59.0	-33.2	G
Canada	2009	2015	7	-19.4	2.2	8.9	-8.3	-17.7	-22.4	G
Greece	1995	2012	18	36.6	-41.0	4.2	-0.2	-93.1	-104.8	G
Ireland	2005	2009	5	-21.3	-4.9	19.1	-7.1	-16.6	-25.2	G
Portugal	1996	2011	16	24.1	-60.2	14.6	-21.5	-64.1	-104.2	G
Spain	1999	2011	13	-0.1	-31.5	12.6	-19.1	-30.1	-55.3	G
Cyprus	2000	2015	16	3.1	-9.6	-21.0	-27.5	-42.7	-81.2	G
Czech Republic	1995	2011	17	73.3	-105.3	41.4	9.4	-118.7	-101.1	G
Slovak Republic	1996	2011	16	-7.4	-47.5	31.4	-23.5	-181.9	-212.0	G
Hungary	1995	2008	14	98.8	-117.3	-7.5	-26.0	-147.0	-161.2	G
Poland	2004	2012	9	13.2	-20.7	8.4	0.8	-34.3	-37.0	G
Romania	1998	2012	15	40.0	-61.8	6.2	-15.6	-39.2	-65.1	G
Croatia	2002	2009	8	19.6	-59.9	-2.2	-42.6	-23.4	-37.3	P
Lithuania	1995	2008	14	-1.2	-35.2	5.4	-31.0	-13.5	-60.0	P
Latvia	2004	2008	5	-26.0	-66.3	9.5	-82.8	-9.0	-84.0	P
Estonia	1995	2008	14	-27.2	-63.0	4.4	-85.8	4.5	-86.1	P
Bulgaria	2001	2009	9	45.3	-119.9	-13.8	-88.4	-0.2	-72.4	P
Mean				21.9	-45.3	4.9	-18.5	-53.0	-76.3	

Note: The sample covers the 1995-2015 period. Deficit periods correspond to periods of deficits larger or equal to -3 percent of GDP. Type G is when the Net Financial Balance of the Government sector is larger than the balance of the private sector (households, non-financial and financial corporations), Type P is when the private sector balance is larger than the public sector. There are 5 P-type episodes and 14 G-type episodes. We drop Malta (2004-2011) due to the difference between the sum of domestic balances and external balances.

Table 2.7: Persistent Current Account Surplus Episodes

				Private				Public	Foreign	
	Start	End	N	HH	NFC	FC	Total	GOV	CA	Type
Austria	2005	2010	6	29.0	1.3	4.4	34.7	-17.7	18.2	P
Belgium	1995	2005	11	99.8	-8.8	-3.5	87.4	-20.3	55.1	P
Denmark	2001	2015	15	-24.5	48.5	39.6	63.6	7.0	62.5	P
France	1997	2001	5	21.0	-0.9	2.8	22.9	-11.5	17.5	P
Germany	2004	2015	12	66.6	18.2	6.1	90.9	-15.7	77.5	P
Japan	1999	2011	13	41.6	65.5	23.6	130.6	-89.0	43.3	P
Korea	2009	2015	7	35.7	-19.9	8.3	24.1	5.7	29.3	P
Netherlands	1995	2015	21	15.0	109.6	19.9	144.6	-35.0	105.9	P
Sweden	1995	2015	21	58.5	-43.3	42.7	57.8	0.2	100.0	P
Finland	1995	2008	14	-7.7	31.5	15.1	38.9	43.3	88.4	G
Norway	1996	2015	20	-8.1	-13.5	18.4	-3.3	258.0	257.6	G
Mean				31.0	4.9	20.7	56.6	12.1	83.2	

Note: The sample covers the 1995-2015 period. Surplus periods correspond to periods of surplus larger or equal to -3 percent of GDP. Type G is when the Net Financial Balance of the Government sector is larger than the balance of the private sector (households, non-financial and financial corporations), Type P is when the private sector balance is larger than the public sector. We drop Luxembourg (2002-2015) due to the difference between the sum of domestic balances and external balances.

2.A Data Definitions and Sources

Table 2.8: Data Definitions and Sources

Variable	Source	Description
Net financial balance	Eurostat & OECD financial accounts (non consolidated)	ratio to GDP
Net financial position	Eurostat & OECD financial balance sheets (non consolidated)	ratio to GDP
Sectoral Saving	Eurostat & OECD non-financial accounts	ratio to GDP
Sectoral Investment	Eurostat & OECD non-financial accounts	ratio to GDP
Current Account	IMF IFS	as a ratio to GDP
GDP growth	IMF IFS	in percent
Population growth	United Nations	in percent
Dependency ratio (old)	United Nations	ratio of people older than 64 to ages 15-64
Dependency ratio (young)	United Nations	ratio of people younger than 14 to ages 15-64
Aging	United Nations	difference between expected old-age dependency ratio in (t+20) and (t)
Terms of Trade	OECD	ratio between the index of export and import prices
NIIP	External Wealth of Nations	as a ratio to GDP
Private credit	World Bank	as a ratio to GDP
GDP per capita	United Nations & IMF IFS	in levels
EBA-lite	IMF	see EBA lite (2016)

2.B Country Coverage

Full sample: United States, United Kingdom, Austria, Belgium, Denmark, France, Germany, Italy, Luxembourg, Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Iceland, Ireland, Malta, Portugal, Spain, Cyprus, Korea, Bulgaria, Czech Republic, Slovak Republic, Estonia, Latvia, Hungary, Lithuania, Croatia, Slovenia, Poland, Romania.

Reduced sample: Surplus countries: France, Belgium, Sweden, Netherlands, Canada, Denmark, Norway, Germany, Finland, Austria, Japan. Deficit countries: Portugal, Cyprus, United Kingdom, Lithuania, Spain, Greece, Czech Republic, Hungary, United States, Slovak Republic, Italy, Estonia.

Current account gap sub-samples: Positive gap: Slovak Republic, Luxembourg, Croatia, Slovenia, Hungary, Italy, Belgium, France, Poland, Denmark, Czech Republic, Canada,

Finland, Austria, Rep. of Korea, Netherlands, Switzerland, Germany, Japan, Norway, Sweden. Negative gap: Bulgaria, Latvia, Greece, Ireland, United States, Lithuania, Romania, Portugal, Estonia, Spain, Malta, Cyprus, United Kingdom.

2.C The Consistency Between the Rest of the World Account and the Balance of Payments Statistics

The new methodology of the balance of payments statistics (BOP) and the rest of the world account (ROW) in the sectoral national accounts (BPM6 Appendix 7 and ESA 2010 Chapter 18) requires full consistency between the two statistics. However, some statistical discrepancies remain. For instance, discrepancies between the net lending of the quarterly Financial Accounts of the BOP and ROW account in the national accounts represented 2.2 percent of the European Union GDP in 2014, see Obrzut, 2016.[45]

Recent Eurostat surveys in 2014 and 2015 (called the "BOP/ROW survey") showed different net recording practices (specifically for financial derivatives), differences in vintages and revisions and different compilation practices (for example some national statistics are compiled by national statistical offices while others are compiled by national central banks) were cited as the main explanations for the discrepancies.

The balance of payments is defined in BPM6 as summarizing transactions between residents and non-residents during a period. It consists of the goods and services account, the primary income account, the secondary income account, the capital account, and the financial account.[46] The stock counterpart is the International Investment Position (IIP) defined as a statistical statement that shows at a point in time the value of: financial assets of residents of an economy that are claims on non-residents or are gold bullion held as reserve assets; and the liabilities of residents of an economy to non-residents. ESA 2010 defines the rest of the world account as a grouping of units without any characteristic functions and resources; it consists of non-resident units insofar as they are engaged in transactions with resident institutional units, or have other economic links with resident units. Its accounts provide an overall view of the economic relationships linking the national economy with the rest of the world. These

[45] Five member states that contribute most prominently to the total discrepancies are Germany, France, Denmark, Italy, and Greece. The discrepancies in terms of stock positions represented 4.4 percent of GDP.

[46] The balance of payments must add to zero, with the Current Account (CA), the Financial Account (FA), the Capital Account (KA) and net Errors and Omissions (EO) in the following manner:

$$CA^{BOP} - (FA^{BOP} + KA^{BOP}) + EO^{BOP} = 0 \tag{11}$$

relationships can be transactions between resident and non-resident institutional units (like in the case of the current account in the balance of payments) and the related stocks of assets and liabilities (similarly in the international investment position).

However, although the two statistics have been made consistent in terms of methodological standards, there are elements that differentiate them. First, the perspective of the rest of the world is that of a non-resident sector that has a relationship with a counterparty sector in the domestic economy. The BOP/IIP is from the perspective of the resident sector. It follows that a current account (net international investment position) surplus of the resident economy is equivalent to a rest of the world financial balance (rest of the world financial position) deficit and vice versa.[47] Additionally, the net lending/net borrowing in the BOP financial account compares to net acquisition of assets/net incurrence of liabilities in the ROW account.

$$NFB^{ROW} = -FA^{BOP} = -(CA^{BOP} + KA^{BOP} + EO^{BOP}) \tag{12}$$

In terms of balance sheet positions, we have the following correspondence:

$$NFP^{ROW} = -NIIP^{IIP} \tag{13}$$

Second, in the rest of the world financial account, the primary classification is by the instrument of investment, whereas in the BOP/IIP financial account classification is given by functional category. A correspondence table maps the links between the functional categories to instrument categories in BPM6 Appendix 7, however, issues remain (Obrzut, 2016). For instance, some ESA 2010 financial instruments correspond to multiple BPM6 categories and other sector-specific instruments seem omitted.[48]

Even if the size of the discrepancy between the two statistics is relatively small, Figure 2.20 shows it can vary between countries, like the United Kingdom (with notoriously small discrepancies) and the United States (with larger discrepancies) for instance.

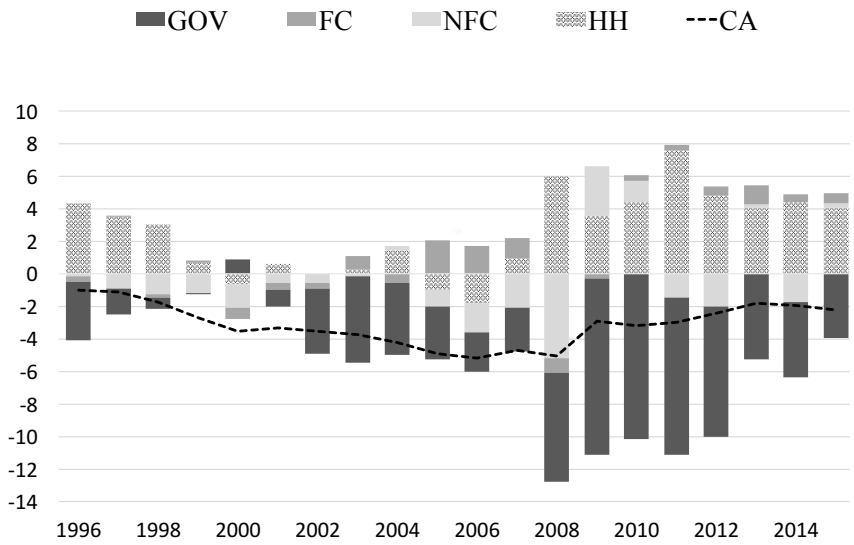
2.D Additional Figures and Tables

[47] Assuming the capital account (KA) and the net errors and omissions (EO) are equal to zero.

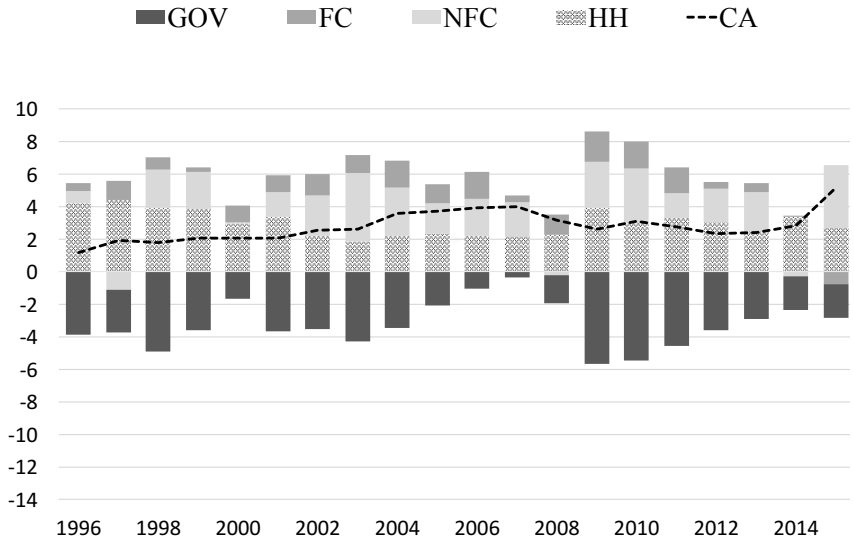
[48] F.5 "Equity" in ESA 2010 for example, could correspond to Direct Investment, Portfolio Investment and Other Investment in BPM6 depending on the nature of the equity.

Figure 2.9: Unweighted Sectoral Contribution to Current Account Balances

(a) Deficit Countries



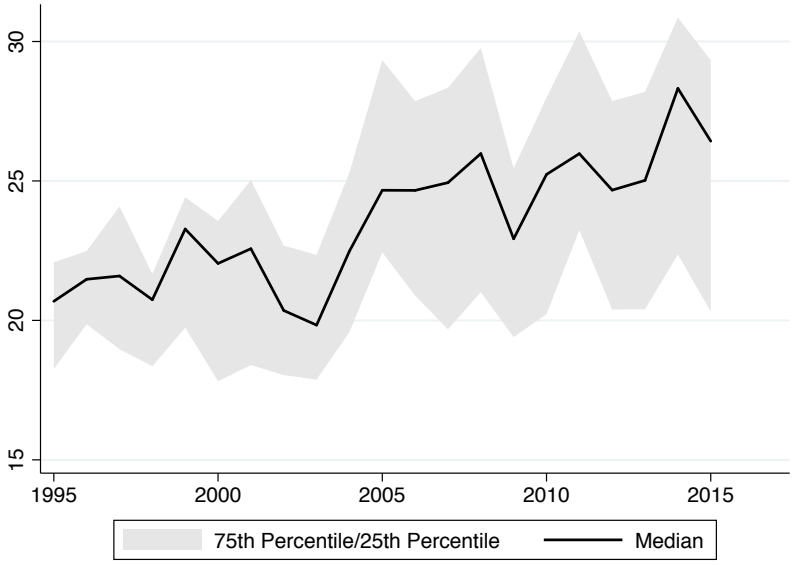
(b) Surplus Countries



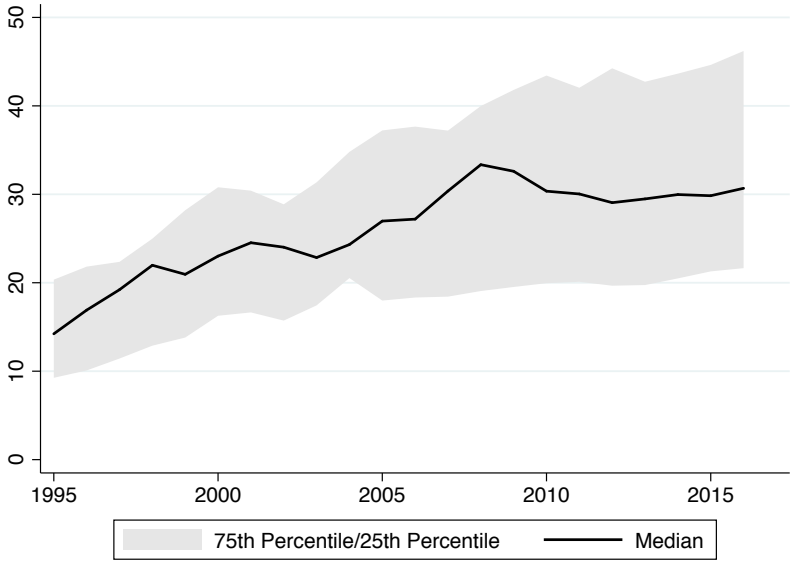
Note: In percent of group GDP. GOV: Government, FC: Financial Corporations, NFC: Non-Financial Corporations, HH: Households, CA: Current Account. Current account surplus countries are: France, Belgium, Sweden, the Netherlands, Canada, Denmark, Norway, Germany, Finland, Austria, and Japan. Current account deficit countries are: Portugal, Cyprus, the United Kingdom, Lithuania, Spain, Greece, Czech Republic, Hungary, the United States, Slovak Republic, Italy, and Estonia.

Figure 2.10: Corporate Sector Dynamics

(a) Earnings of the NFC sector



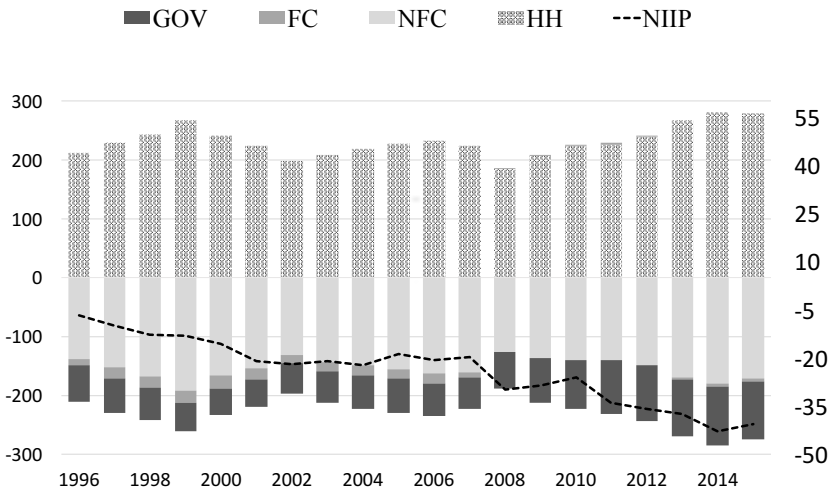
(b) Foreign Ownership of the NFC and FC sectors



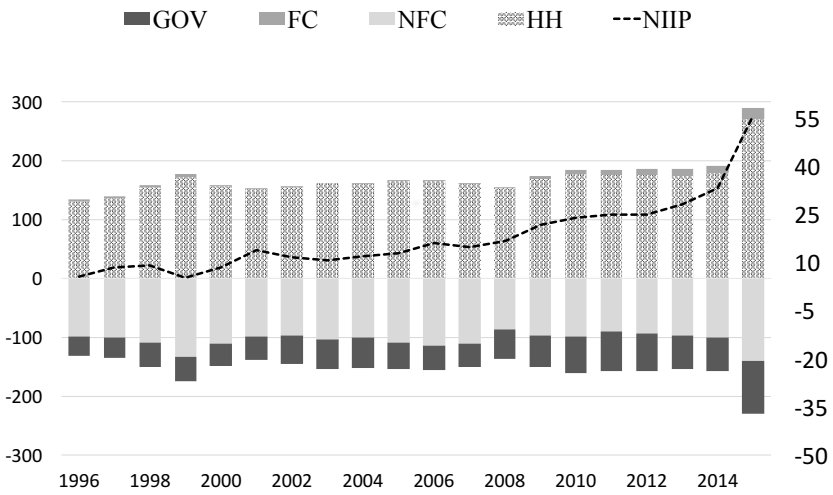
Note: Figure (a) shows the Gross Operating Surplus of the NFC sector in percent of GDP. Figure (b) depicts the share of the equity holdings of foreign portfolio and foreign direct investors relative to domestic outstanding equities of the NFC and FC sector. Error bands represent the 25th and 75th percentiles.

Figure 2.11: Unweighted Sectoral Contribution to Net International Investment Positions

(a) Deficit Countries



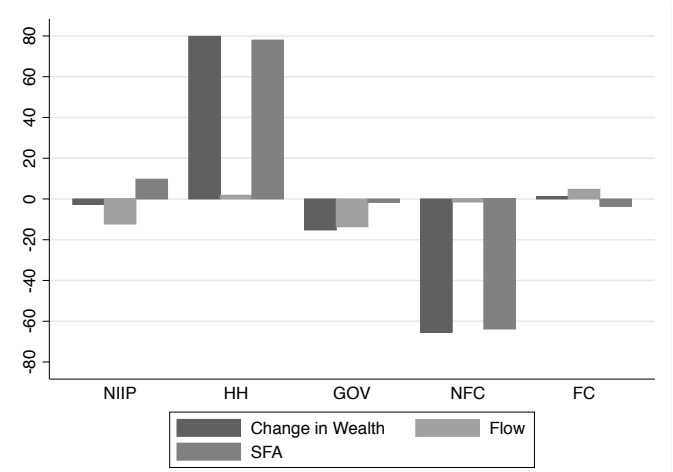
(b) Surplus Countries



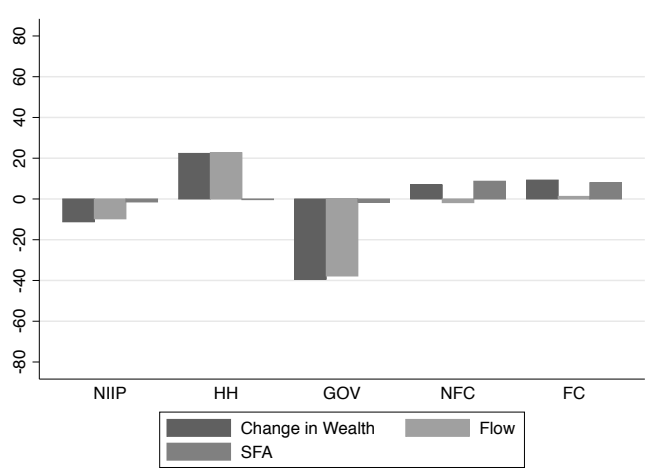
Note: In percent of group GDP. GOV: Government, FC: Financial Corporations, NFC: Non-Financial Corporations, HH: Households, NIIP: Net International Investment Position. Current account surplus countries are: France, Belgium, Sweden, the Netherlands, Canada, Denmark, Norway, Germany, Finland, Austria, and Japan. Current account deficit countries are: Portugal, Cyprus, the United Kingdom, Lithuania, Spain, Greece, Czech Republic, Hungary, the United States, Slovak Republic, Italy, and Estonia.

Figure 2.12: Flow and Stock-Flow Adjustments of Sectoral Balance Sheets

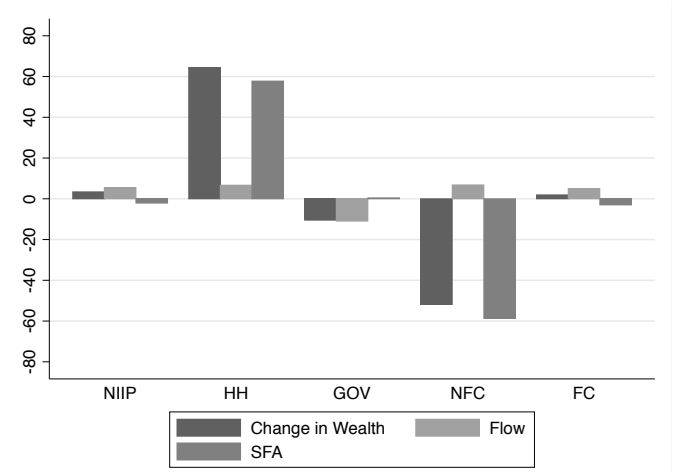
(a) Deficit Countries: 2003-2007



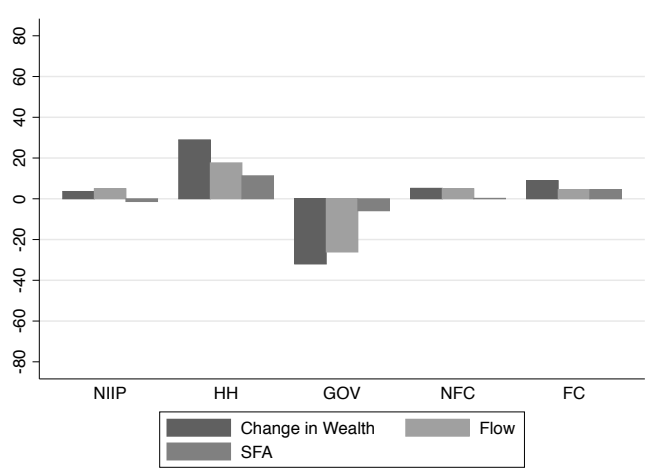
(b) Deficit Countries: 2008-2013



(c) Surplus Countries: 2003-2007

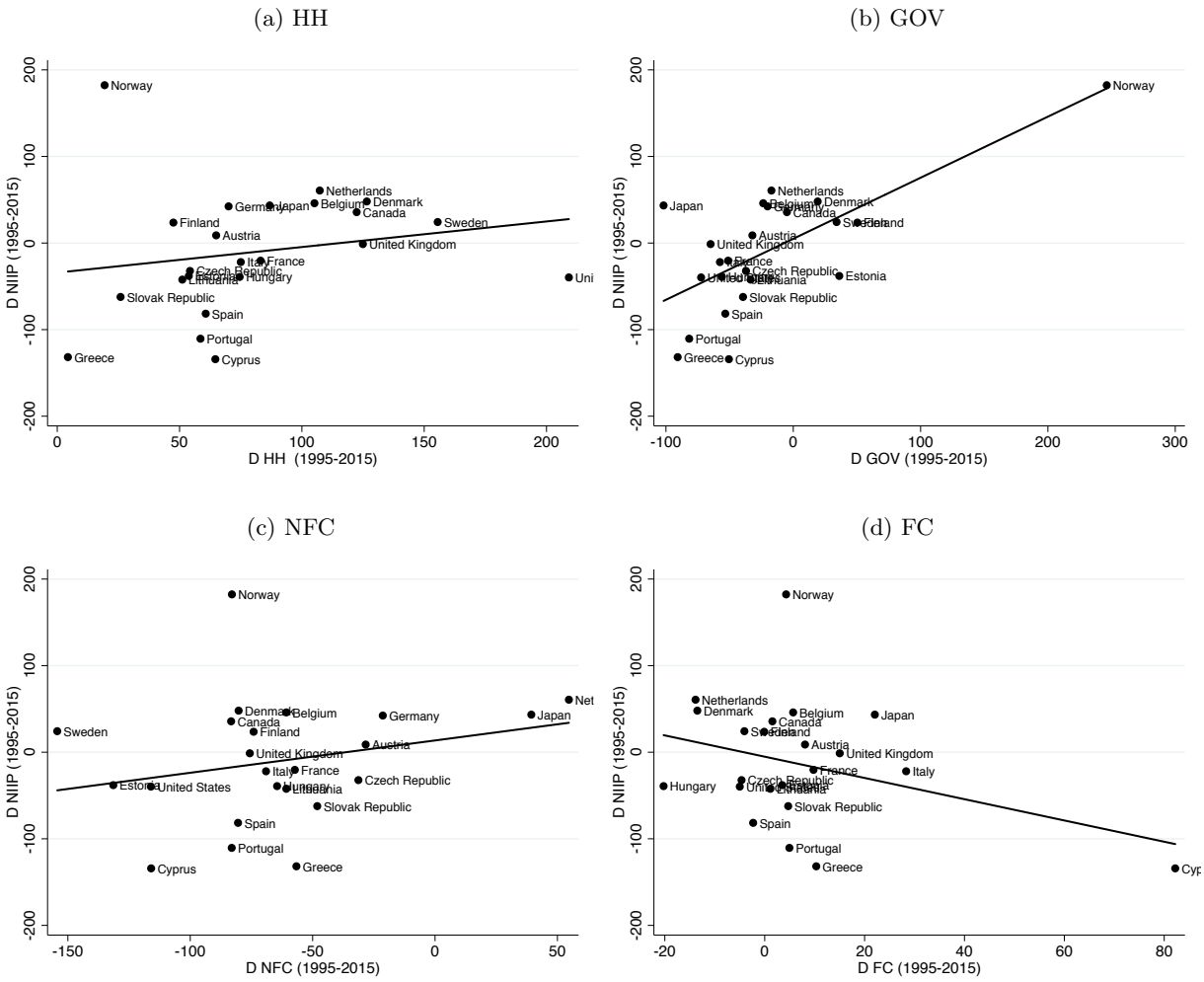


(d) Surplus Countries: 2008-2013



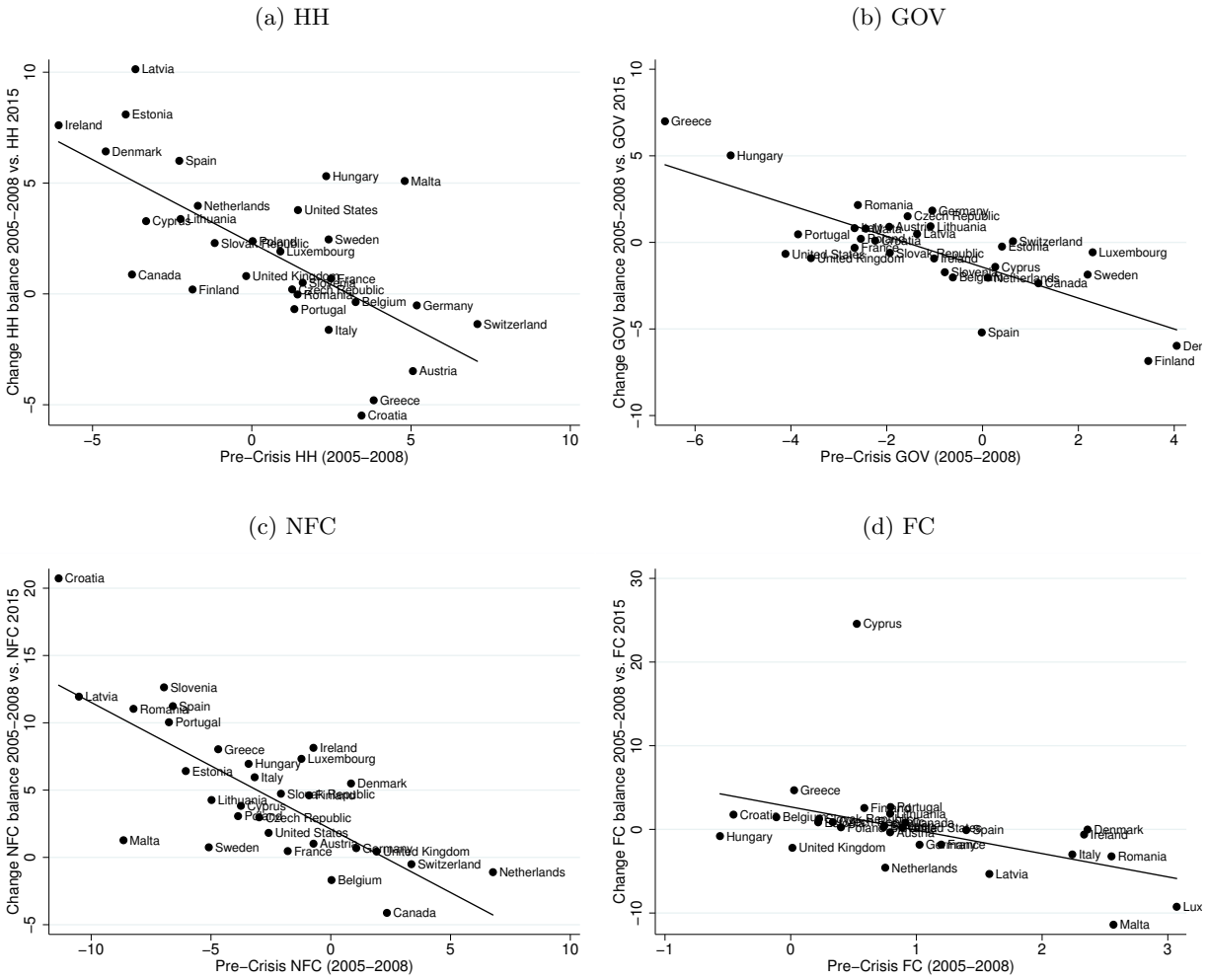
Note: HH: Households, NFC: Non-Financial Corporations, FC: Financial Corporations, GOV: Government. Change in wealth is the change in net financial position of the sector. Flow is the cumulated net financial balance and Stock-Flow Adjustment (SFA) is the difference between the two. Stock-Flow Adjustment (SFA) not due to transactions and is used as a proxy for valuation changes. Current account surplus countries are: France, Belgium, Sweden, the Netherlands, Canada, Denmark, Norway, Germany, Finland, Austria, and Japan. Current account deficit countries are: Portugal, Cyprus, the United Kingdom, Lithuania, Spain, Greece, Czech Republic, Hungary, the United States, Slovak Republic, Italy, and Estonia. In percent of GDP.

Figure 2.13: Change in Financial Wealth: NIIP and Across Domestic Sectors



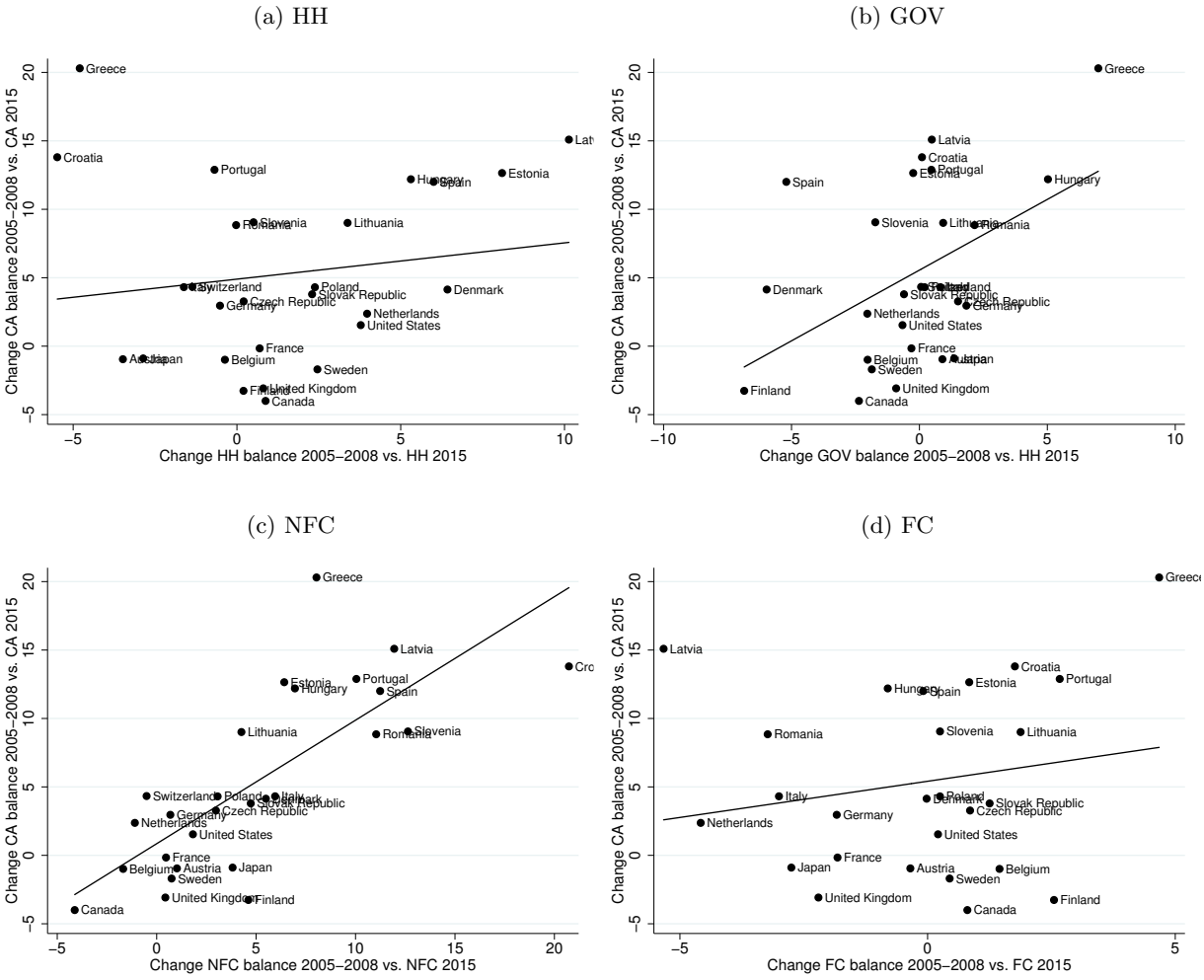
Note: HH: Households, NFC: Non-Financial Corporations, GOV: Government, FC: Financial Corporations. Change in financial net wealth of each sector between 1995 and 2015 against the change in net international investment position. In percent of GDP.

Figure 2.14: Post-Crisis Adjustment Process Within Sectors



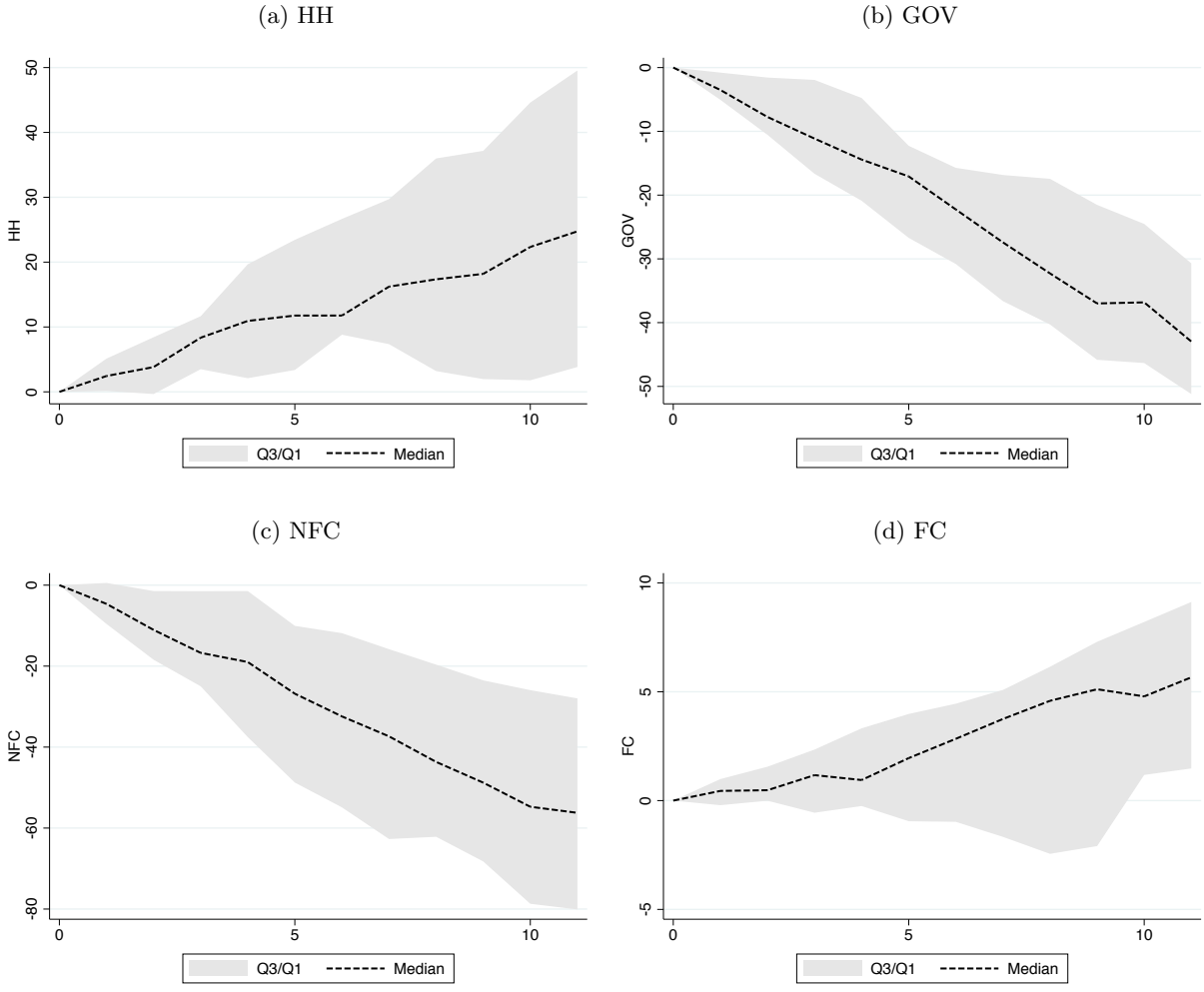
Note: Scatter of the sector's average pre-crisis balance (between 2005 and 2008) and its the post-crisis adjustment (i.e. the change between the average balance between 2005-2008 and its 2015 value). Households (HH), Government (GOV), Non-Financial Corporations (NFC), Financial Corporations (FC). In percent of GDP.

Figure 2.15: Post-Crisis Adjustment of the Current Account and Contemporaneous Sector Balance



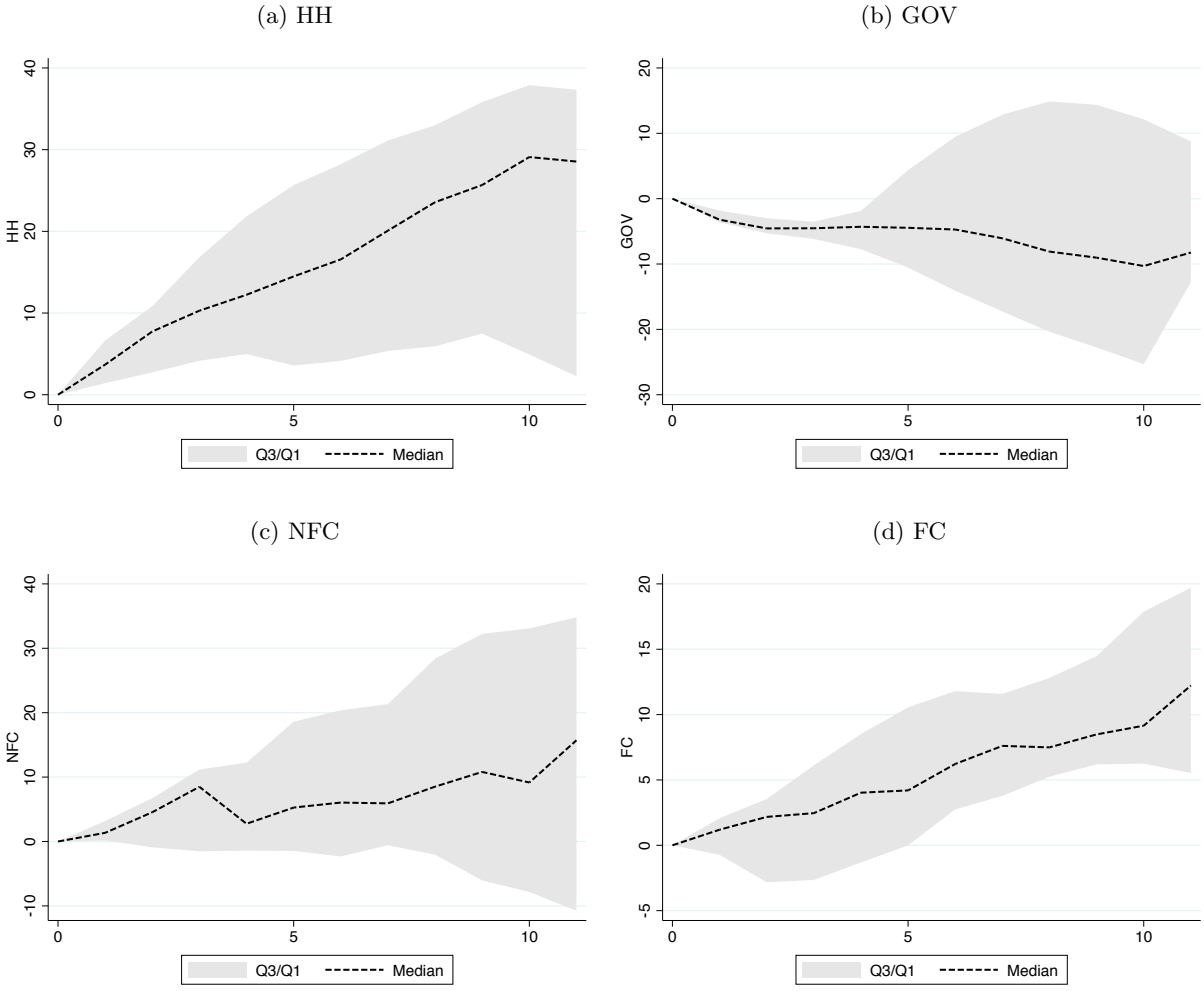
Note: Plot of the post-crisis adjustment (i.e. the change between the average balance between 2005-2008 and its 2015 value) of the current account against the contemporaneous sectoral adjustment. Households (HH), Government (GOV), Non-Financial Corporations (NFC), Financial Corporations (FC). In percent of GDP.

Figure 2.16: Sectoral Flows During Persistent Current Account Deficits



Note: Cross-country median with error bands of each sector's net financial balance during the external episode. 0 marks the beginning of the episode. In computing the median values, we drop the most extreme cases: Iceland, Luxembourg, Malta, and Cyprus. See following Tables for a complete list of the external episodes. All Variables in percent of GDP.

Figure 2.17: Sectoral Flows During Persistent Current Account Surpluses



Note: Cross-country median with error bands of each sector's net financial balance during the external episode. 0 marks the beginning of the episode. In computing the median values, we drop the most extreme cases: Luxembourg. See following Tables for a complete list of the external episodes. All Variables in percent of GDP.

Figure 2.18: Sectoral Stocks During Persistent Current Account Surpluses

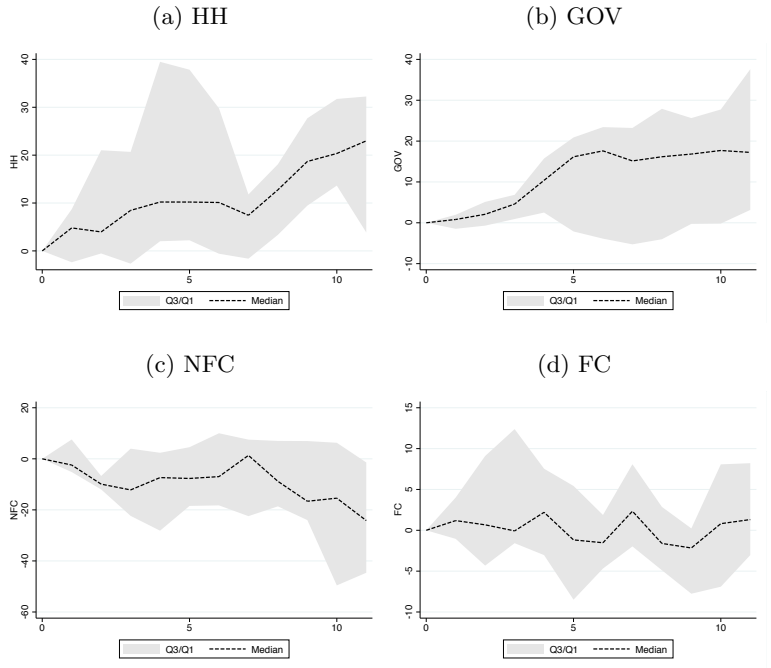
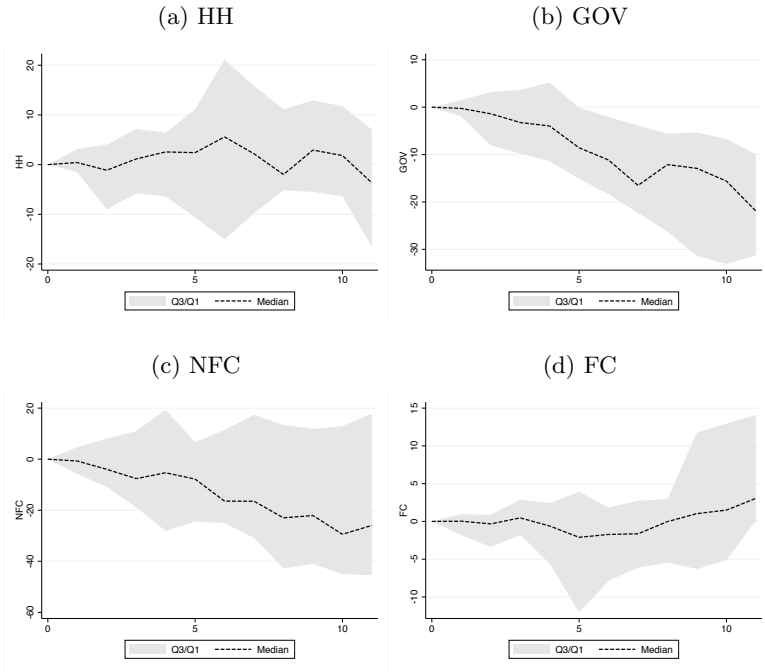
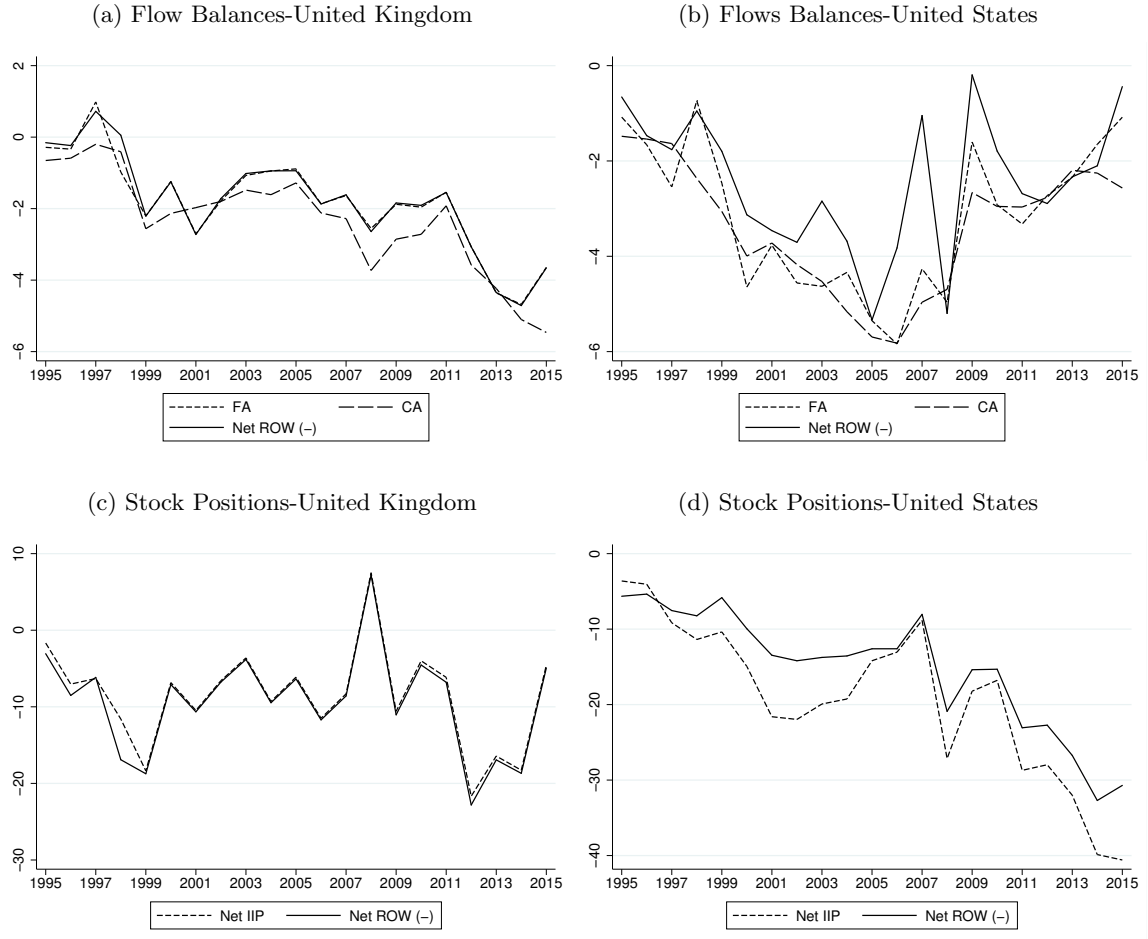


Figure 2.19: Sectoral Stocks During Persistent Current Account Deficits



Note: Cross-country median with error bands of each sector's net financial position during the external episode. 0 marks the beginning of the episode. In computing the median values, we drop the most extreme cases: Luxembourg and Malta. See following Tables for a complete list of the external episodes. All Variables in percent of GDP.

Figure 2.20: Discrepancies Between Sector Accounts and BOP/IIP



Note: The Financial Account (FA), Current Account (CA) and the Net International Investment Position (Net IIP) are from the Balance of Payments and Investment Position Statistics (BOP/IIP). Net ROW (-) is the Rest of the World net financial balance from the sector accounts in graph (a) and (b) and the net financial position in graph (c) and (d). In both cases, the variables' signs are changed. All Variables in percent of GDP.

Table 2.9: The Covariates of the Current Account Balance

	(1) Sav	(2) Inv	(3) HH Sav	(4) HH Inv	(5) GOV Sav	(6) GOV Inv	(7) NFC Sav	(8) NFC Inv	(9) FC Sav	(10) FC Inv
GDP Growth	-0.074	-0.106	-0.056	-0.045	0.082	-0.031	-0.065	-0.037	-0.034*	0.006
	(0.198)	(0.207)	(0.064)	(0.049)	(0.050)	(0.037)	(0.122)	(0.131)	(0.019)	(0.009)
Population growth	-4.691***	-3.081*	-0.296	-0.254	-1.618***	-0.198	-2.475***	-2.718***	-0.302**	0.089
	(1.572)	(1.664)	(0.496)	(0.421)	(0.445)	(0.296)	(0.933)	(1.040)	(0.149)	(0.065)
GDP per capita	0.475***	0.274***	0.059**	0.056**	0.203***	0.050***	0.189***	0.168***	0.024**	-0.001
	(0.096)	(0.097)	(0.025)	(0.023)	(0.035)	(0.015)	(0.058)	(0.062)	(0.011)	(0.004)
Dependency ratio (old)	-0.469**	-0.564***	-0.127**	-0.232***	-0.143***	-0.064*	-0.146	-0.232*	-0.052**	-0.035***
	(0.200)	(0.216)	(0.059)	(0.053)	(0.054)	(0.035)	(0.136)	(0.132)	(0.020)	(0.009)
Aging Speed	-0.282	-0.212	0.003	-0.032	-0.224***	-0.019	-0.083	-0.165	0.021	0.004
	(0.191)	(0.185)	(0.064)	(0.035)	(0.047)	(0.038)	(0.107)	(0.119)	(0.018)	(0.006)
Lagged NIIP	0.019	0.019	0.007	0.005	-0.004	-0.001	0.010	0.014	0.005*	0.002
	(0.032)	(0.032)	(0.008)	(0.007)	(0.006)	(0.005)	(0.021)	(0.020)	(0.003)	(0.001)
Global Financial Crisis	-0.044	-0.016	-0.017	-0.004	-0.009	-0.001	-0.016	-0.012	-0.003	0.000
	(0.041)	(0.041)	(0.012)	(0.009)	(0.009)	(0.008)	(0.024)	(0.026)	(0.004)	(0.002)
Financial Center	-0.012	-0.008	0.004	-0.005	-0.020***	-0.001	0.011	-0.002	-0.008**	0.000
	(0.020)	(0.019)	(0.006)	(0.004)	(0.006)	(0.003)	(0.013)	(0.012)	(0.003)	(0.001)
Observations	154	154	154	154	154	154	154	154	154	154
Adjusted R^2	0.24	0.08	0.09	0.18	0.45	0.13	0.10	0.04	0.15	0.11

Panel OLS estimation over the 1995-2015 period with 3 year non-overlapping averages and robust standards errors. Time fixed effects are included. The dependent variables are the aggregate saving (S) and investment (I) and saving and investment of the domestic sectors (HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations), in percent of GDP. See text for more information of the control variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.10: The Covariates of the Current Account Balance: Lagged GOV Balance

	(1) CA	(2) HH	(3) GOV	(4) NFC	(5) FC
GDP Growth	-0.172*	-0.006	0.099*	-0.198***	-0.067
	(0.089)	(0.077)	(0.053)	(0.064)	(0.063)
Population growth	-2.432***	0.125	-0.865**	-1.258**	-0.933**
	(0.750)	(0.515)	(0.421)	(0.599)	(0.420)
GDP per capita	0.164***	0.004	0.059***	0.055*	0.031
	(0.038)	(0.032)	(0.022)	(0.032)	(0.020)
Dependency ratio (old)	-0.076	0.161***	-0.028	-0.246***	-0.028
	(0.067)	(0.050)	(0.043)	(0.064)	(0.046)
Aging Speed	0.133*	-0.101*	-0.061	0.213***	0.038
	(0.068)	(0.052)	(0.052)	(0.056)	(0.041)
Lagged NIIP	0.015	0.008	-0.003	0.014	-0.003
	(0.011)	(0.006)	(0.006)	(0.010)	(0.008)
Global Financial Crisis	-0.042***	0.002	-0.039***	0.004	-0.004
	(0.014)	(0.011)	(0.011)	(0.013)	(0.009)
Financial Center	0.020***	0.010*	-0.003	0.015**	-0.002
	(0.008)	(0.005)	(0.004)	(0.007)	(0.005)
L3.GOV	0.421***	-0.246**	0.778***	-0.099	-0.012
	(0.114)	(0.097)	(0.065)	(0.088)	(0.059)
Observations	133	133	133	133	133
Adjusted R^2	0.61	0.21	0.77	0.38	0.02

Panel OLS estimation over the 1995-2015 period with 3 year non-overlapping averages and robust standards errors. Time fixed effects are included. The dependent variables are the current account balance (CA) and the net financial balances of the main domestic sectors (HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations), in percent of GDP. See text for more information of the control variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.11: Alternative Specification: EBA-Lite, IMF (2016)

	(1) CA	(2) HH	(3) GOV	(4) NFC	(5) FC
Private credit/GDP, demeaned	-0.013	-0.021	-0.019*	0.026	0.021
	(0.015)	(0.013)	(0.011)	(0.018)	(0.014)
Change in reserves/GDP	-0.038	0.182	-0.245	-0.260	0.147
	(0.157)	(0.168)	(0.156)	(0.174)	(0.163)
Change in reserves/GDP × K controls	0.004	0.001	0.005*	0.006	-0.004
	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)
K controls	0.305***	0.110	0.099*	0.140	-0.039
	(0.098)	(0.085)	(0.055)	(0.104)	(0.065)
GDP growth-forecast in 5 years	-0.674	-0.923*	0.883**	-0.928*	0.035
	(0.528)	(0.480)	(0.396)	(0.515)	(0.446)
Lagged NIIP	-0.000	-0.006	-0.003	0.009	0.003
	(0.013)	(0.008)	(0.008)	(0.013)	(0.008)
L.Output per worker-relative to top 3 economies × K controls	0.006***	0.002	0.003***	0.003	-0.001
	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
L.Output per worker-relative to top 3 economies	0.125***	0.038	0.024	0.050*	-0.000
	(0.031)	(0.024)	(0.021)	(0.027)	(0.020)
Oil and Natural Gas Trade Balance*resource temporariness	0.252***	-0.183***	0.614***	-0.184**	0.008
	(0.083)	(0.070)	(0.072)	(0.078)	(0.052)
Population growth	-1.524*	0.204	0.248	-2.608***	-0.074
	(0.854)	(0.677)	(0.677)	(0.834)	(0.475)
Dependency ratio (old)	-0.055	0.256	-0.308**	-0.451**	0.229
	(0.197)	(0.188)	(0.135)	(0.189)	(0.209)
Aging Speed	-0.200	0.005	-0.906***	-0.000	0.388
	(0.422)	(0.373)	(0.288)	(0.339)	(0.333)
Aging Speed × Dependency ratio (old)	0.008	-0.006	0.025***	0.007	-0.011
	(0.012)	(0.010)	(0.008)	(0.010)	(0.009)
ICRG index	0.157***	-0.118***	0.219***	0.022	-0.010
	(0.057)	(0.040)	(0.040)	(0.046)	(0.030)
Financial Center	0.299	-0.301	-0.696	1.787*	-0.790
	(0.987)	(0.655)	(0.765)	(0.904)	(0.701)
Remittance/GDP	-0.414	0.245	-0.115	0.061	-0.748
	(0.499)	(0.464)	(0.349)	(0.548)	(0.637)
Terms of trade of goods × Trade openness	0.000	0.000**	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade openness	-0.242	-0.498**	0.382*	-0.358	0.031
	(0.322)	(0.242)	(0.222)	(0.308)	(0.221)
Terms of trade of goods	-0.001	-0.001	0.001**	-0.002***	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Output gap	-0.519***	-0.213	0.030	-0.091	-0.236**
	(0.137)	(0.136)	(0.165)	(0.119)	(0.116)
Observations	128	128	128	128	128
Adjusted R^2	0.74	0.29	0.74	0.51	0.09

Panel OLS estimation over the 1995-2015 period with 3 year non-overlapping averages and robust standards errors. No time fixed effects are included. The dependent variables are the current account and each net financial balances of the domestic sectors (HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations), in percent of GDP. See text for more information of the control variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2.12: Alternative Specification: Chinn (2017)

	(1) CA	(2) HH	(3) GOV	(4) NFC	(5) FC
Dependency ratio (young)	-0.241**	0.055	-0.084	-0.122	-0.085
	(0.101)	(0.070)	(0.078)	(0.094)	(0.060)
Lagged NIIP	0.010	0.016**	-0.016**	0.015	-0.006
	(0.011)	(0.006)	(0.007)	(0.010)	(0.007)
GDP per capita	0.385***	0.005	0.055	0.281***	-0.006
	(0.058)	(0.045)	(0.045)	(0.051)	(0.035)
GDP pc squared	-0.001*	-0.001*	0.002***	-0.003***	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Dependency ratio (old)	-0.156**	0.155***	-0.075	-0.259***	0.004
	(0.064)	(0.051)	(0.051)	(0.069)	(0.052)
Private Credit	-0.032***	-0.007	-0.018***	0.002	-0.002
	(0.007)	(0.006)	(0.005)	(0.008)	(0.008)
Log Terms of Trade	-2.416	7.800***	-11.868***	0.986	0.193
	(3.524)	(2.198)	(3.069)	(3.083)	(2.074)
GDP Growth	-0.167**	0.009	0.067	-0.164***	-0.057
	(0.079)	(0.068)	(0.071)	(0.061)	(0.036)
Observations	153	153	153	153	153
Adjusted R^2	0.61	0.25	0.58	0.40	0.00

Panel OLS estimation over the 1995-2015 period with 3 year non-overlapping averages and robust standards errors. Time fixed effects are included. The dependent variables are the current account balance (CA) and the net financial balances of the main domestic sectors (HH: Households, GOV: Government, NFC: Non-Financial Corporations, FC: Financial Corporations), in percent of GDP. See text for more information of the control variables. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Chapter 3

Household Wealth and the Net International Investment Position[1]

[1] A version of this paper is Revise and Resubmit at *International Finance*.

3.1 Introduction

This paper studies the link between two major stylized facts that have emerged since 1970 in advanced countries: (i) the rise in aggregate household wealth; and (ii) the rise in international financial integration and Net International Investment Positions (NIIP) dispersions. In order to do this, we look at the covariation patterns between changes in the NIIP and household wealth in selected countries over the 1970-2013 period. Indeed, swings in aggregate wealth are correlated with other macroeconomic variables, however, little is known of their linkages with the external position (see Lane, 2015b).[2]

In the past few decades, foreign and domestic balance sheets have expanded considerably in advanced countries, (see Figure 3.1a and 3.1b). The size of household balance sheets, measured by the ratio of total assets and total liabilities to national income, has increased on average from around 3.5 years of national income to 7.5 years in our sample of countries since 1970. This trend was in large part due to house price appreciation (see for instance Piketty and Zucman, 2014 and Knoll, Schularick, and Steger, 2017) and it was accompanied by a similar trend in mortgage lending (Jorda, Schularick, and Taylor, 2016 and Mian, Sufi, and Verner, 2017).[3] Moreover, the size of international balance sheets has risen dramatically from an average of 0.3 to over 6 years of national income, reflecting the considerable increase in the size of cross-border holdings and financial integration. In turn, this has led to diverging current accounts and net international investment positions (Lane and Milesi-Ferretti, 2007).

What are the possible linkages between the dynamics of household wealth and the net international investment position? Households have direct exposures - through foreign deposits, bonds and real estate and funding from foreign banks - and indirect exposures - through their interactions with domestic banks and firms - to the rest of the world. Indeed, the bulk of cross-border transactions are undertaken by banks. For instance, if household wealth increases, due to a rise in share prices or house prices above the general rise of prices, and this increase is expected to be permanent, one can expect ambiguous implications on the external balance.[4] Namely, households could: (i) accumulate more international assets improving the stock of international assets (the old "traditional view"); (ii) become less constrained and borrow more, leading to net debt inflows; or (iii) feel richer and therefore save less and spend more, deteriorating the current account. In theory, under perfect capital markets, households could smooth their consumption patterns over time, all sectors would be less exposed to

[2]See Cooper and Dynan (2013) for a survey on the effects of aggregate wealth changes on economic activity. However, to our knowledge, this is the first attempt at studying the international implications of changes in aggregate household wealth.

[3]However, there remain considerable cross-country and time-series heterogeneity in the composition of household holdings, but also in the valuation patterns of household wealth.

[4]Households are also exposed to external shocks, this is left for future extensions.

domestic output shocks through international risk sharing and capital or wealth could be allocated to the most productive economies (from high wealth to low wealth countries in search of higher returns). However, imperfections in the international capital markets and home bias in household portfolios could lead increases in wealth to act as a catalyst for domestic lending booms, or create bubbles in the non-tradable sector by miss-allocating capital inflows (see Lane and McQuade, 2012, Reis, 2013, and Piketty and Saez, 2013) or to have potentially negative effects on consumption and labour market outcomes.[5]

Accordingly, in order to get a clearer picture of the previously undocumented covariation patterns present in the data, this paper pursues three broad lines of analysis. First, we look at the relationship between changes in net international investment positions and net household wealth. Second, we use an accounting framework to decompose changes in wealth into cumulated flows and valuation adjustments, in order to assess if the increase in household wealth - due to saving induced wealth accumulation or capital gains - differentially affected the country's international holdings and transactions. Third, in order to investigate what category of asset or liability drives this co-movement, we decompose both net positions into their components. Namely, the net international investment position is broken down into net international equity and net international debt; household wealth is decomposed into gross housing assets, financial assets, and liabilities. In addition, we provide a more detailed analysis of the contribution of capital gains associated with real estate.

What are the implications of the empirical findings, and how do they insert themselves into both the existing theoretical and empirical literature? To preview the results, this paper establishes a striking negative correlation between changes in (lagged) household wealth and the net international investment position and the current account that survives the inclusion of the control variables found in the literature. This relationship is driven by housing assets and financial liabilities components of household wealth (financial assets or even net financial assets are not found to be significantly correlated). Furthermore, it finds different signs for the coefficient of savings induced wealth and valuation adjustments. Indeed, the savings induced wealth is positively associated with changes in the NIIP. However, the increase in wealth due to capital gains is negatively linked with the external balance, giving some evidence of wealth or collateral effects, somewhat in line with Fratzscher, Juvenal, and Sarno (2010). The results also show that the net international debt component of the NIIP-composed mostly of cross-border bank loans- is an important driver of this co-movement.

Our analysis of the linkages between household wealth and international investment positions is in line with the expanding macroeconomic literature on balance sheets. Each sector of the

[5]See the conceptual framework section for a more detailed discussion on the potential theoretical mechanisms linking household wealth to the NIIP. An increase in the value of domestic assets also leads to firm and bank wealth and collateral effects, as their assets are also worth more. Therefore, there can be self-reinforcing effects between lending and demand channels.

economy (households, government, corporations and the rest of the world) saw their balance sheet grow considerably in the run-up to the crisis.[6] In addition to the previously cited Lane and Milesi-Ferretti (2007) and Piketty and Zucman (2014), this research also builds on the literature analyzing transitory income shocks to the current account, see amongst others Kraay and Ventura (2000 and 2003), Tille and Wincoop (2010) and Guo and Jin (2009). These papers focus on the shifts in international portfolios when countries are faced with an increase in savings, whereas this paper looks at the international implications of an increase in wealth due to savings and capital gains. The study of these imbalances is important as they are seen to be predictors of future crisis (see Catao and Milesi-Ferretti, 2014) and can aggravate the impact of the crisis (see Lane and Milesi-Ferretti, 2012).

Furthermore, considering the importance of real estate holdings for the household sector, this research is also related to the literature linking house prices to the current account and housing wealth effects. Concerning the former, there is no consensus on the direction of the causal link between capital inflows and house prices.[7] In relation to wealth effects, an array of papers show a considerably different marginal propensity to consume out of different types of assets.[8] Given that real estate is a particular type of asset providing a potential return but also offering a service, an increase in its value yields various conflicting effects that depend on the development of mortgage markets (Skudelny, 2009) and tend to lead fluctuations in other variables (Slacalek, 2009).[9] On the other hand, Buiter (2010) argues that there should be no real effects due to changes in house prices.[10] Additionally, given the distributional issues that arise with the increase in wealth, Kumhof et al. (2012) and Behringer and Treeck (2018) who link the rise in inequality to the deterioration of current account balances are also pertinent.

This research has some potential policy implications for financial stability. Changes in household wealth can be associated with changes in the net international equity position, leading to potentially more efficient risk sharing, or in the net international debt position, leading to an increase in the economy's external vulnerability. Given the available data, the latter seems to prevail, potentially justifying macroprudential measures in order to mitigate these effects. Moreover, the heterogeneous composition (and concentration) of wealth holdings implies divergent responses to shocks between countries, which can be important in times of crisis

[6] The balance sheets of the other sectors in the economy have also fluctuated. However, the net position of the household sector is much larger than the public or the corporate sector. The analysis of these sectors is left to future extensions.

[7] Aizenman and Jinjarak (2009) argue that it is cross-border capital inflows that affect house prices. On the contrary, Favilukis et al. (2012) find this effect to be small in magnitude and Geerolf and Grjebine (2013) argue the causality goes in the other direction.

[8] See amongst others Ludwig and Slok (2004) and Aron et al. (2012).

[9] Particularities of real estate as an asset include its limited liquidity, the presence of an underlying mortgage, strong bequest motives, and that it is predominantly held by residents.

[10] Buiter (2010) argues that house price appreciation increases by the same amount the cost of housing services, leaving no effect on aggregate demand.

prevention or management. In addition, if there is an increase in the (lagged) wealth-income ratio, policymakers should adjust their expectations for the net international investment position. Nevertheless, it is important to stress that we cannot talk about causality given the paper's setup.

The rest of this paper is structured in the following manner. First, it will analyze the conceptual framework and put forward the econometric specifications. Then, it will review the stylized facts and present the empirical results. Finally, it will conclude and give possible extensions.

3.2 Conceptual Framework

The aim of this paper is to build on the growing availability of data on stocks of assets and liabilities, in order to assess the impact of changes in household wealth on the external position. Given the potential heterogeneous behaviour between changes in balance sheet variables due to flows and valuation adjustments and also across the different categories of cross-border and household portfolios, this paper will breakdown both household wealth and international wealth in order to get a clearer picture of the underlying linkages.

In order to accomplish this, we will first present the simple accounting identity used to construct "notional" net international investment positions and saving induced wealth accumulation that are cleansed of their valuation component.[11] In a similar manner we will construct wealth-income ratios that are composed uniquely of valuation adjustments. Bearing in mind that the core question of the paper is the co-movement between household wealth and the NIIP, we will then briefly outline the patterns that standard economic theory would lead us to expect.

3.2.1 Wealth Accumulation Methodology

Both international and household wealth can be decomposed into changes in *flows* and *valuation*, using a simple accounting framework. This identity states that the difference between the value of two stock variables between two dates is equal to the cumulated flows over the period and a valuation adjustment term. Piketty and Zucman (2014) and Lane and Milesi-Ferretti (2007) use this identity to derive the valuation term as a residual. Lane and Milesi-Ferretti

[11] The "notional" NIIP consists of the cumulated current account balances added to the initial NIIP. Likewise for the "saving wealth-income ratio".

(2007) use the cumulated current account as the flow and derive a Stock-Flow Adjustment (SFA) term that encompasses both the valuation term and other statistical changes, see equation (1). Piketty and Zucman (2014) use constant private savings (encompassing household savings and firms' retained earnings) as the flow.[12] As they use constant values, the residual is a real capital gain, KG_t, that is the capital gains relative price effect vis a vis the GDP deflator, see equation (2).[13] [14]

$$NIIP_{t+1} = NIIP_t + CA_t + SFA_t \tag{3.1}$$

$$W_{t+1} = W_t + S_t + KG_t \tag{3.2}$$

Using equation (1) and (2) respectively, we can then compute the valuation terms for both W_t and $NIIP_t$. Using this approach is not without its drawbacks (see Curcuru, Thomas, and Warnock, 2009, amongst others). The KG_t and SFA_t terms also incorporate "net other" terms. For household wealth, it incorporates net other volume changes that contain new construction permits and the discovery of national resources, for instance. However, the magnitude of these other volume changes is small in the countries that report them in our sample.[15] For the decomposition of the NIIP, the residual includes net other adjustments that include data revisions, reclassifications, and other statistical changes. We interpret the non-flow adjustment of the stock of wealth as a proxy for valuation changes by assuming statistical changes and errors do not follow a systematic pattern over time and countries. Moreover, it is important to note that the magnitude of valuation adjustments on household can be sizable and dwarf the much-studied valuation adjustments on international wealth.

Furthermore, we construct a "notional", or a simulated wealth-income ratio that is cleansed of its valuation component, by simply adding the flows to the initial stock position, see equation (3). We also construct a capital gains induced wealth-income ratio, see equation (4), by adding the capital gains to the initial wealth-income ratio (see the data appendix of Piketty and Zucman, 2014). We perform the same exercise to construct a notional net international

[12] Piketty and Zucman (2014) depart from the System of National Accounts (SNA) methodology by using private savings (household and firms) instead of household or personal savings. Modigliani and Miller (1958) famously showed that there exists substitutability between corporate retained earnings and household savings. By using the SNA methodology, Piketty and Zucman (2014) find that capital gains are too large and correspond to the accumulation of corporate savings to finance new investment (ultimately increase stock prices), rather than to true relative price effects. In our robustness checks we use both measures.

[13] There are arguments in favor of using the CPI instead of the GDP deflator. However, the availability of the GDP deflator is much greater.

[14] The authors compute two methods of decomposition, an additive method and a multiplicative method. We calculate both methods and see that using either measure does not alter the results.

[15] Total other volume changes (on financial assets + non-financial assets - liabilities) are small in magnitude. For instance, since 1979 total other changes average at 0.94 percent of national income per annum in France.

investment position, see equation (5), by adding the current account to the initial stock position. A drawback of this method is that it can be dependent on the choice of the initial starting point. To account for this, we perform the exercise on multiple different initial dates without finding any significant difference.

$$\text{Sav } W_{t+1} = W_t + S_t \tag{3.3}$$

$$\text{KG } W_{t+1} = W_t + KG_t \tag{3.4}$$

$$\text{Notional } NIIP_{t+1} = NIIP_t + CA_t \tag{3.5}$$

3.2.2 Theoretical Mechanisms

What do standard economic theory models tell us on the expected correlations between net aggregate household wealth and the Net International Investment Position? In a world with perfect capital markets, standard international macroeconomics predicts that domestic wealth would equalize across countries, as countries with high domestic capital stock would invest some of that capital in countries with low domestic capital in search of a higher marginal product of capital. In turn, these countries would build up a positive NIIP. On the contrary, countries with low domestic capital stock would then run negative external balances (see Piketty and Saez, 2013). However, this is not observed in the data, as summarized by Obstfeld and Rogoff (2001), for instance. Imperfections in international capital markets and home bias in household portfolios are sources of friction that could lead to the buildup of domestic asset price booms.

A key question is, do households believe the increase in wealth to be transitory or permanent? In the case of transitory positive shock, consumption theory predicts that households would increase their savings. We can build on the literature on portfolio growth versus re-balancing of the current account in cases of income shocks, where it is assumed that a temporary increase in wealth equates to an increase in savings.[16] This strand finds that countries invest their marginal unit of savings abroad in the short run and both at home and abroad in the long run, keeping their portfolios share stable.

However, household wealth also varies because of fluctuations in the valuation of the assets.[17] Empirically, increases in capital gains wealth are relatively persistent, leading us to believe

[16] See Kraay and Ventura (2000 and 2003), Tille and Wincoop (2010) and Guo and Jin (2009).

[17] Kraay and Ventura (2000 and 2003) do not differentiate between increases in wealth due to savings and capital gains.

households could view them as permanent increases in wealth. Accordingly, we can build on the large literature on wealth and collateral effects. In this case, the expected co-movement between changes in wealth due to valuation changes and the external balance is ambiguous. When the value of assets increases (due to a rise in share or house prices for instance), households may feel richer and spend more by increasing their lifetime consumption (of both domestic goods and foreign goods), deteriorating the external balance.[18] Households could also save and increase their foreign asset holdings, thus improving the net international investment position. Moreover, on the liabilities side, an increase in net worth will relax households' liquidity constraints. Indeed, if household assets are worth more, they can borrow more, this is the classic "financial accelerator effect".[19] This can affect the external balances directly and indirectly. Households can directly borrow from abroad, or borrow from domestic banks that could in turn fund themselves abroad. Ultimately, this will lead to a deterioration of the net international debt position of the country. This effect falls in line with the micro evidence of over-accumulation of debt in the face of housing booms (see Mian and Sufi, 2011, for instance). Likewise, banks and firms see their financial constraints loosen and can borrow more as their assets are also worth more. Hence, the lending channel will impact the capital inflows and outflows of the country.

3.3 Empirical Strategy

3.3.1 Econometric Specifications

As the focus of this paper is to assess the linkages between household wealth and the net international investment position, it performs a pooled panel OLS estimation of the following equation:

$$\Delta NIIP_{it} = \alpha + \beta \Delta W_{it-1} + \gamma X_{it} + \epsilon_{it} \tag{3.6}$$

Due to the presence of non-stationarity in our variables, the changes in both the dependent variable, the net international investment position ($\Delta NIIP_{it}$), and the independent variable, lagged household wealth (ΔW_{it-1}), are taken.[20] We use both annual data and a sample split

[18] However, wealth is more concentrated than income; thus the effect could be dampened as the holders of wealth have a lower marginal propensity to consume.

[19] See amongst others Bernanke (2009).

[20] After first differencing the variables, one can reject the hypothesis that the residuals contain a unit root using standard panel unit root tests. Additionally, panel cointegration reveals no statistically significant relationship.

into lower frequencies of two, three, and four-year periods, respectively. In order to reduce fears of endogeneity bias and to take into account the expected "sluggishness" of the link, we take the lagged value of our explanatory variable.[21] As this paper does not aim to establish new fundamental shifters of the NIIP, but simply to assess the additional explanatory power of household wealth in determining changes in the net international investment position, we control for the macroeconomic fundamentals of the existing literature, building upon Lane and Milesi-Ferretti (2002). Thus X_{it} represents real USD per capita national income (in natural log form), the demographic structure (the aging speed) and the change in public debt (see Lane and Milesi-Ferretti 2002 and 2012).[22]

Accordingly, our econometric strategy is in three steps. Our first step is to regress the changes in the net international investment position on the lagged change in household wealth, controlling for other variables. Second, we will then decompose the right and left-hand side stock variables in terms of flows and valuation effects. In other words, we break down the net international investment position into the cumulated current account and its valuation component (see the following section), whereas household wealth is split into changes in wealth due to the accumulation of savings and capital gains. Third, we disaggregate both the right and left-hand side variables into their respective components, with the wealth-income ratio divided into gross housing assets, financial assets and liabilities and the net international investment position into net international equity and net international debt.[23] Importantly, our econometric specification does not allow us to identify a causal link between our variables, only covariation patterns.

3.3.2 The Data

Piketty and Zucman (2014), and the updated Wealth and Income database (WID), compiled a dataset of harmonized wealth estimates measured at market value following the accounting recommendations of the U.N. System of National Accounts (SNA 1993 and 2008).[24] The

[21] To address the problem of omitted variable bias we also perform an OLS regression with country fixed effects and multiple other controls, the results remain similar in magnitude and significance. For more details, see the sub-section entitled robustness checks.

[22] We also control for additional demographic variables like old and young age dependency ratios. However, Lane and Milesi-Ferretti (2012) argue that aging speed is a better indicator for the NIIP. Aging speed is constructed as the projected difference between the old age dependency ratio in year t+20 and the ratio in year t.

[23] The net international equity (debt) is the difference between total international equity (debt) assets and total international equity (debt) liabilities.

[24] This definition of wealth does not account for human capital (like households' knowledge and skills or future expected earnings) given the difficult to assign a monetary value to it.

series covers 11 countries from 1970-2013, and 14 countries for shorter time-series.[25] These countries represent a large part of the developed world, totalizing between 60 and 70 percent of world GDP between 1970 and 2013. In the EWN dataset, Lane and Milesi-Ferretti derived estimates of external balance sheets for 145 countries over the 1970-2014 period using a consistent valuation methodology. All variables are in percent of net national income.

According to the SNA guidelines, the net wealth of a sector of an economy, or "net worth", is the difference between assets and liabilities of the residents of the country in that sector. The national accounts statisticians estimate the value of net wealth for households and NPISH, the corporate sector, the public sector, and the foreign sector.[26] These assets and liabilities can be broken down into financial and non-financial assets and in turn into subcategories. Financial assets are decomposed into currency, deposits, bonds and loans, equities and fund shares and life insurance and pension fund. Whereas non-financial assets can be of three sorts, housing assets, business assets, and other non-financial assets. Housing assets can be divided into land underlying dwellings and dwellings (when the split is available in the data), whereas business assets are decomposed into agricultural land and other domestic capital (primarily composed of offices, structures, machines, patents, etc.). Each component of household wealth has varying degrees of volatility and liquidity. The market value of business assets, for example, is very stable in most countries. This is also the case for currency, deposits, bonds, and loans, which are less subject to valuation effects than equities, for instance. Additionally, it should be noted that real estate is a particular type of asset that provides a service but also a potential return, remains relatively illiquid vis-a-vis other assets, and is predominantly held by residents.[27]

From the outset, it is important to stress that while there is a growing availability of both international and sectoral balance sheets, there still exits several limitations to our study pushing us to be prudent in our conclusions. For instance, we do not have time-series data on the direct foreign exposures of the different sectors and particularly households prior to 2001.[28] Indeed, the wealth estimates of Piketty and Zucman (2014) are compiled on the residency basis and thus we cannot distinguish between foreign-held or domestically-held assets of the households. Households' direct exposures to the rest of the world (though foreign deposits, bonds and real estate and funding from foreign banks) are relatively small in magnitude, as the

[25]The results of our regressions do not change significantly if we use the balanced or unbalanced sample of countries. List of countries in the full sample: United States, United Kingdom, Denmark, France, Germany, Italy, Sweden, Canada, Japan, Spain, Australia. The unbalanced sample has Greece, Korea, and the Czech Republic in addition.

[26]Non-profit Institutions Serving Households (NPISH) are merged with the household sector by convention.

[27]There exists limited coverage of cross-border residential real estate transactions and exposures in balance of payments data, although recent efforts have been made to take into account these transactions and holdings, see Curcuru, Thomas, and Warnock (2009).

[28]The year 2001 marked the beginning of large scale reporting of the Coordinated Portfolio Investment Survey (CPIS).

bulk of cross-border transactions are undertaken by banks.[29] Nevertheless, households are also indirectly exposed through their interactions with domestic banks or corporations.[30] Hence, given the nature of the financial linkages and data available, looking at the co-movement between household wealth and the external position seems like the best approximation to study the foreign held of the ultimate exposures of households to financial integration.[31] Another drawback is that the data on foreign wealth and transactions do not capture all the cross-border transactions and holdings of households, see for instance Zucman (2013) who shows that rich residents can hold an increasing amount of assets in tax havens that do not appear in the official net international investment positions and in our results.[32] Cross-border holdings of high wealth households that are not intermediated by the domestic financial system are also not directly captured in Balance of Payments or International Investment Position surveys. Furthermore, given the aggregate nature of our explanatory variable, we cannot say much regarding the distribution of wealth in our setup.

3.4 Stylized Facts

This paper investigates the link between two major stylized facts that have emerged since 1970: (i) the rise in household wealth as a ratio to national income; and (ii) the rise in gross foreign assets and liabilities and net international investment position dispersions. However, these trends hide considerable heterogeneity across countries in terms of levels of net wealth, the composition of holdings, and the contribution of transactions and valuation adjustments to changes in the levels of wealth.

3.4.1 The Size of the Balance Sheets and the Net Positions

Figure 3.1 shows a considerable increase in the size of foreign and domestic balance sheets since 1970. The size of household balance sheets, measured by the ratio of total assets and total liabilities to national income, has increased on average from around 3.5 years of national income to 7.5 years in our sample of countries since 1970. This was due to a generally

[29] Households held a relatively stable portion of around 3% of total foreign portfolio holdings between 2004 and 2014, see Galstyan et al. 2016, indirect holdings through mutual funds, for instance, can be larger.

[30] Either directly through their equity holdings of these domestic firms or by the behaviour of these firms. For instance, Lane and McQuade (2014) show that net foreign debt-fueled an increase in domestic lending in the Euro area through an increase in domestic banks balance sheets.

[31] Additionally, it is housing and not financial assets that drives our results, mitigating fears that our specification only captures a mechanical correlation due to the net foreign exposures of households.

[32] It is not possible to measure the portfolio securities entrusted by households to offshore custodian banks, estimated to be around 6% of household financial wealth globally.

increasing trend in net aggregate household wealth, documented by Piketty and Zucman (2014) and it was accompanied by a similar trend in mortgage lending (Jorda, Schularick, and Taylor, 2016 and Mian, Sufi, and Verner, 2017), see Figure 3.2. Net household wealth represented between two and four years of national income in 1970 and between four and six years in 2013 in our sample of countries. In historical perspective, household wealth was at a relatively low level during the 1970s, when polices (such as rent controls, credit ceilings, and nationalizations) may have depressed household wealth and asset prices may not have fully recovered from the Second World War. The take-off in household wealth seems to have occurred in the 1980s, with a series of policies, initiated notably by the Reagan and Thatcher administrations aimed at easing financial repression and privatization of state-owned firms. This led to faster growth of household wealth until 1995. In 2000, the dot-com bubble burst, leading to a financial crisis, the subsequent recovery lasted until the global financial crisis. The increase in household wealth could be partly due to transfers from the corporate or public sector.[33]

Moreover, the size of international balance sheets has risen dramatically from an average of 0.3 to over 6 years of national income, reflecting the considerable increase in the size of cross-border holdings and financial integration, (see Figure 3.1b). This has led to diverging current accounts and net international investment positions (Lane and Milesi-Ferretti, 2007). These large gross position increases have been accompanied by net positions dispersions. Industrial countries have on average experienced a deterioration of their NIIP, with dispersion rising considerably in the 2000s reflected in a large widening of current account balances. In our sample, the number of countries undergoing deteriorations and improvements of their external balance is relatively balanced since 1980.[34] However, most countries still have negative net positions in 2007. During and after the crisis, capital flows have declined sharply and current account balances have narrowed (see Lane and Milesi-Ferretti, 2012 and 2014). Figure 3.3 shows that the median net international investment position has gradually deteriorated, mostly due to an accumulation of net international debt.

In spite of this relatively homogeneous increasing trend, there remains considerable heterogeneity in the initial and final levels of net wealth and time-series dynamics. For instance, Japan did not follow the general trend and experienced a boom until its financial crisis in 1990 and a subsequently lost decade.[35] For instance, the relatively low levels of household wealth

[33] Accordingly, it is important to study their joint dynamics. We control for the change in public debt in our main specifications and the net lending of the corporate sector in our robustness checks. In our sample, the average net position of the public sector has gradually decreased close to 0, whereas net corporate wealth has oscillated between 30 and 100 percent of national income in a subsample of countries.

[34] The United States, the United Kingdom, France, Italy, Spain, and Australia have suffered deteriorating balances, while Denmark, Sweden, Canada, Japan, and Germany have experienced improvements.

[35] There exists a variety of explanations for the disparity in levels of wealth between advanced countries, see De Bonis, Fano, and Sbano (2013) for more detail. These include household participation in financial markets, social security, cultural norms influencing the level of debt.

in Germany, Denmark and Sweden and the North American countries and Australia vis a vis the rest of Europe and Japan is noteworthy, see Figure 3.4 for the median, high (Spain) and low values (Germany). This could be due to lower real estate or stock market prices, a transfer of public wealth at a favorable price through privatizations or differences in pension schemes. Additionally, there have been big increases in Spain and Italy, but more moderate rises in Canada, Germany, and Japan (since the 90s, after the end of the bubble). On the foreign side, the large accumulation of net international assets in Japan and Germany is in stark contrast to the accumulation of net international liabilities in Spain. Indeed, Figure 3.5 shows that the country with the highest household wealth, in this case Spain, is the country with the largest net international investment position deficit. Likewise for the country with the lowest household wealth, Germany, has the the largest creditor. Going further, Figure 3.7a shows that there is a negative association between changes in household wealth and changes the net international investment position.

3.4.2 The Composition of Household and International Balance Sheets

The composition of household holdings and international balance sheets varies considerably across countries. For household assets, some countries holding a higher share of housing (like France, for instance) and others with higher equity ownership (like the United States and the United Kingdom, for example). On the gross asset side, non-financial wealth is traditionally more important for households than other sectors due to the importance of real estate holdings, which peaked almost everywhere before the global financial crisis, see Figure 3.8a. However, in some countries households hold relatively more financial assets than non-financial assets. Thus, the different types of assets can be responsible for the increase across countries. For instance, the increasing value of housing assets was the main driver in the increases of assets in Italy, Spain, Australia, and France, whereas financial assets dominated in Canada and the United States. Interestingly, Japan followed both of these trends, with housing consisting of the bulk of the rise before the 1990 crisis and financial assets post-crisis.

Breaking down household financial assets, we see some disparity within our sample that can be traced back to the pension schemes in place. In some countries, life insurance and pension funds wealth is the largest component of financial wealth, like in the United States, Australia, and Canada. However, currency, deposits, bonds, and loans represent the largest component in Germany, France, Japan, Spain, and Korea. Additionally, some countries like Germany have particularly low equity holdings vis-a-vis the sample median.

Digging deeper into housing assets, we see a large part of the increase in the stock is due to the value of the land underlying dwellings as opposed to the value of the dwellings them-

selves.[36] This confirms the findings of Knoll, Schularick, and Steger 2017.[37] However, this general rise in house prices was absent in Germany and Japan, where house prices fell in real terms during that period. This was notably attributed to excessive supply after a construction boom following the reunification in Germany and the bursting of the housing bubble in the early 1990s in Japan's case.[38] Moreover, mortgage markets have become progressively developed and deregulated, increasing the liquidity of housing wealth as it has become easier for households to adjust their portfolios and borrow against housing wealth.

On the gross liabilities side, households have also considerably increased their gross financial liabilities, confirming the trend in mortgage loans depicted in Jorda, Schularick, and Taylor (2016). In our balanced sample, the mean household financial liabilities increased from 47 percent of national income in 1970 to 108 percent in 2010. On the high end of the spectrum, Australia, Japan, and the United Kingdom have increased their financial liabilities by over 80 percentage points over the 1980-2007 period. In contrast, there has been relatively moderate increases in France and Canada (36 and 28 points respectively), and very low increases in Germany (11 percentage points). A closer look at German household financial liabilities shows they have decreased over the 1970-2013 period 68 to 66 percent of national income, with a slight increase in the late 1990s to 85 percent of national income. In Japan, there was a large buildup of liabilities until the early 1990s and since then they have been stable at around 100 percent of national income.

Moreover, the composition of international balance sheets has some cross-country heterogeneity and has experienced considerable changes over time. Figure 3.9 shows that international debt assets and liabilities dominate the gross holdings of the countries in our sample. Whilst most of the countries in our sample had positive net international equity positions in 2007, confirming the trend found in advanced countries in Lane and Milesi-Ferretti (2007), Japan, Spain, and Australia have negative balances, with Japan being the only country in our dataset with a positive net international debt position.[39] In terms of change, all countries bar Japan and Germany have experienced a negative change in their net foreign debt balance since 1980, indicating increased reliance on debt liabilities as a source of external finance (see for instance Lane and Milesi-Ferretti, 2014). Spain, on the other hand, is an outlier as it has experienced a deterioration of both its external debt and equity positions.

[36] The breakdown is not available, however, for all countries.

[37] They find a "hockey-stick" shaped pattern, with constant houses prices up to the mid-20th century and a strong subsequent rise thereafter. They also find that 80% of the recent increase in house prices (between 1950 and 2012) can be attributed to land price appreciation as opposed to construction costs.

[38] Additionally, the value of dwellings is not always larger than the value of the land underlying the dwellings, like in Denmark, France, Germany, Sweden, and the Netherlands for instance. However, in all countries, the value of land is more volatile than the value of the dwellings.

[39] Indeed, Japan is "long debt, short equity", unlike most advanced countries who are "short debt, long equity".

3.4.3 Flow and Non-Flow Adjustments

Turning to the adjustment of wealth in terms of flows and valuation changes, there remains considerable heterogeneity across countries. For household wealth, we compare the dynamics of the savings wealth-income ratio and the capital gains wealth-income, see Figure 3.6. Despite the general rise in wealth, the saving induced wealth-income ratio is decreasing in a number of countries since the 1980s and 1990s, like the United States, the United Kingdom, Australia, and Spain notably. The accumulation of savings is rising, but lower than total wealth in Denmark, France, Italy, and Japan, giving rise positive capital gains. This is in stark contrast to the accumulation profile of Germany (or to a lesser extent Sweden) for instance, who have consistently had capital losses on household wealth since 1970, see Table 3.1. Furthermore, these valuation patterns that can be very large in magnitude and dwarf the valuation adjustments on international wealth. Indeed, on the eve of the global financial crisis, the cumulated capital gains on household wealth in the United States reached nearly 200 percent of national income, whereas the cumulated SFA on international wealth was under 50 percent of national income.

Turning to the relative role of cumulated current account balances and valuation effects in the dynamics of the net international investment positions, we see contrasting results in our group of countries. As Table 3.2 shows, whilst all countries apart from Japan and Germany were ruining NIIP deficits in on the eve of the crisis, we only see a negative impact of the cumulated current account for the United States, the United Kingdom, Spain, and Australia over the 1980-2007 period. Moreover, the SFA term only contributed positively in the Anglo-Saxon countries (the United States, the United Kingdom, Australia, and Canada). All other countries in our sample experienced losses on their cross-border wealth over that period. In terms of magnitude, cumulative valuation changes on household wealth are a lot larger than those on international wealth. This is notable, given the importance the macroeconomic literature gives to valuation effects on international wealth.

Breaking down household wealth, Figure 3.6 shows that the increasing (decreasing) capital gains wealth-income ratio in Spain (Germany) is associated with an increasing deterioration (improvement) of the net investment position. Furthermore, Figure 3.7b shows that there is a negative (unconditional) correlation between capital gains household wealth and the net international investment position.

In summary, net household wealth dynamics - and particularly capital gains- seem to be closely tied to net international investment position - and particularly net international debt positions- in our sample of countries over the 1970-2013 period.

3.5 Empirical Results

3.5.1 The Net International Investment Position and Household Wealth

Table 3.3 shows a clear negative association between changes in the lagged value of the household wealth and the net international investment position of the countries of our sample over 1971-2013, which survives the inclusion of the literature's set of control variables. As shown in Table 3.6, narrowing our sample down to the post-1990 period, we see that the magnitude of our results is considerably strengthened. Additionally, the results hold at lower frequency patterns, splitting the sample into two, three and four-year periods, and multiple other specifications (Table 3.6 and 3.8).

We find that an increase of 10 percent of the change in the lagged wealth-income ratio is associated with a negative change in the net international investment position to national income ratio of 0.7 percent. The sign, significance, and magnitude of this coefficient survive across all specifications. In terms of the magnitude of the coefficients, an increase in one standard deviation of lagged household wealth decreases the net international investment position by 0.2 standard deviations, everything else constant.[40] Post-1990, a 10 percent increase in the change of wealth leads close to a 1 percent deterioration in both the yearly and split samples, see Table 3.6. We do take note of a considerable jump in R^2 when looking at the current account. We see that between column (1) and (4), the R^2 jumps from 6 to 17 percent. This may be due to the considerable noise of the SFA term.[41]

Decomposing wealth, we see conflicting effects of saving induced wealth accumulation and capital gains. The change in the saving induced wealth-income ratio is positively associated with the two dependent variables (insignificantly however in the first case), in line with Kraay and Ventura (2000 and 2003). In contrast, the change in capital gains induced wealth-income ratio is negatively associated with changes in the NIIP and the current account. A 10 percent increase in the lagged change of capital gains induced wealth is correlated with a deterioration of 0.8 percent of the change in NIIP and 0.4 percent of the current account, everything else equal. In contrast, an increase of the same amount in the saving induced wealth-income ratio is associated with an increase of 2.8 percent of the change in the current account.

Following the permanent income hypothesis, one would expect a wealth increase due to capital gains to have contrasting effects in the case that it is seen to be temporary or permanent.

[40] This is higher than any of the control variables.

[41] A related topic is the possible stabilization or destabilizing role of the SFA term. In other words, in light of an increase in household wealth does the valuation of foreign wealth co-move in the same direction. Here, the effect seems to be slightly dampened when we cleanse the NIIP of the SFA.

Households would be more likely to increase savings in response to the increase in temporary "excess wealth", leading to a current account surplus. On the other hand, a permanent increase in lifetime wealth would push households to consume or borrow more, leading to a current account deficit and a deterioration of the net international investment position. There is strong persistence in the changes of the observed change in household wealth, in the savings induced wealth and the valuation wealth.[42] This indicates that households may believe these changes to be permanent. Overall, we find suggestive evidence of a relaxation of constraints.

Turning to the control variables, the signs of the coefficients seem to be somewhat in line with the predictions of the theory. The coefficient of the change in public debt (non-significant for the NIIP regressions but significant for the current account) is negative, in line with the literature where the Ricardian equivalence does not hold. Income does not seem to matter in our main specification, which could be expected given the advanced nature of the economies in our sample. Turning to our demography variable, we see that aging speed is positively associated with changes in the net international investment position. This is to be expected as countries where the population is getting old more rapidly would tend to increase their savings, improving the external position everything else equal.[43]

3.5.2 Decomposing the NIIP and Household Wealth

Considering that net household wealth incorporates both financial and non-financial assets, but also the indebtedness of households, we desegregate the wealth-income ratio into housing assets, financial assets and liabilities, and perform the same regressions stated in equation 1, in order to assess if the different components of household wealth have different covariation patterns with the external position. Table 3.4 shows that changes in housing assets and financial liabilities are the main drivers of the correlation with the net international investment position. Surprisingly, financial assets do not play a role in the association.[44] The magnitude of the effect increases further when we look at the post-1990 period.[45]

Controlling for other factors, we see that a 10 percent increase in the lagged change housing assets relative to national income is associated with negative change in the NIIP of 1.2 percent of national income. On the other side, an increase in the change of household financial liabilities is also significantly negatively associated with the change of both the observed and

[42] For all our sample, the AR(1) of the change in household wealth is 0.63, savings wealth 0.89 and capital gains wealth 0.61. Results available upon request.

[43] We take the lag of all our control variables as a robustness check and the results do not change.

[44] Further decomposing financial assets, we see a significantly positive effect of life insurance and pension fund wealth.

[45] Results available upon request.

the current account. This could be in line with the literature on "over-borrowing" in times of housing booms.

Next, we decompose our dependent variable. The net international investment position can be divided into net international equity and net international debt positions. This allows us to check through which channel the increase in household wealth affects the external position. We find that by and large the relation linking household wealth (in its capital gains induced accumulation but also in its housing component) to the net international investment position goes through the net international debt position, see Table 3.5. Like before, the magnitude of the coefficients is reinforced when analyzing the post-1990 period. We find that a 10 percent increase in the lagged change of household wealth is associated with a deterioration of 0.6 percent in the change of the net international debt position. However, the effect on net international equity is nonexistent. Additionally, it is the capital gains wealth-income ratio that drives the correlation, with the savings induced wealth having no significant effect, everything else constant. If we further decompose the net international debt position into net other investment and net portfolio debt, we see that the former is responsible for the negative association, in line with our easing of financial constraints narrative as net other investment is primarily cross-border bank loans.[46]

Furthermore, looking at the breakdown of the different components of household wealth and the net international equity and net international debt positions, we see that it is again the housing assets and liabilities components that drive the correlation and financial assets are not significantly associated with either net equity or net debt.

Finally, we look at the accumulation of housing assets in particular. In Table 3.6, we apply the same accounting framework to the variations in the value of the housing stock.[47] Decomposing between residential investment and a residual capital gains term, we see that both components are negatively correlated with the change in the net international investment position. This is in line with the current account literature, where residential investment is traditionally a good predictor of the current account balance. The effect also gets larger in magnitude after 1990. On the net international investment position side, net international debt is responsible for the correlation, with the lagged change in residential investment induced housing wealth-income ratio strongly negatively correlated with the change in the net international debt position.

[46]However, no household wealth variables (components or decomposition) are significantly associated with net foreign portfolio debt. Results available upon request.

[47]Due to lack of data, we assume a uniform residential depreciation rate of 1 percent, in order to compute the net residential investment flow. We also perform robustness checks for 0.5 and 1.5 and the results are very similar.

3.5.3 Extensions and Robustness Checks

There are several candidates for omitted variable bias in our analysis. Although our sample includes exclusively developed countries, there remain substantial differences in institutions and regulation between countries. For instance, mortgage markets structures or social pension systems can vary considerably within our sample of countries and other country-specific competing explanations are also possible.[48] With all this in mind, we estimate our main econometric specification using country fixed effects in Table 3.6. The sign, magnitude, and significance do not change compared to our original results. Additionally, financial deregulation might also be an omitted variable. To control for this, we use the Fraser Institute Index of Economic Freedom (both the total score and the sub-score related to the regulation of credit, business, and labour) and the Financial Reform Index constructed by Abiad, Detragiache, and Tressel (2010) respectively.[49] However, the magnitude of the effect does not change. Table 3.6 also shows that changing the initial date of our wealth decomposition from 1970 to 1980 (or later depending on data availability) does not change our results. Moreover, we perform additional robustness checks by splitting the sample into two, three and four-year periods with results reported in Table 3.6. For completeness, we also lag all our controls, without altering the results. Finally, if we use the flow of savings and capital gains instead of the change in notional stock positions the results are unchanged.

Additionally, fluctuations in the valuation of international assets could have an impact on rich households that hold foreign assets. However, the magnitude of valuation changes of foreign wealth (SFA) is relatively small vis-a-vis capital gains on household wealth. Also, as documented by Zucman (2014), a proportion of the "super-rich" have a tendency to hide their assets in tax havens, which could complicate the identification of their reaction to SFA changes.

3.6 Concluding Remarks

In this paper, we relate the rise in household wealth to a deterioration of the net international investment position in a sample of advanced countries over the 1970-2013 period. In particular, increases in household wealth changes due valuation adjustments are strongly associated with changes in the net international debt position, but not the net international equity position,

[48] Mortgage markets differ on the method of fixation of rates (fixed versus variable), on the maximum loan to value ratio or on taxation for instance. Wealth estimates are constructed using national sources; thus permanent differences in accounting methodology could also potentially drive the results.

[49] For the Economic Freedom index, as there are only values every five years for the years prior to 2000, we linearly interpolate.

providing suggestive evidence of potential housing wealth and collateral effects. All these covariation patterns get relatively stronger after 1990 and persist at both higher and lower frequencies.

In relation to our main findings, we observe conflicting signs in the covariation patterns between the savings side of wealth accumulation and the valuation adjustment. Indeed, we find that (lagged) saving induced wealth accumulation is positively (and not always significantly) correlated with the net international investment position and the cumulated current account, while the capital gains induced wealth is the force driving the negative correlation. A related issue is how much households believe that the increase in wealth due to capital gains is transitory or permanent? Following the permanent income hypothesis, households would be more likely to increase savings in response to the increase in temporary "excess wealth", leading to a current account surplus. However, capital gains are persistent over time, leading us to believe households see it as a permanent increase in wealth. Moreover, breaking down aggregate household wealth into its housing assets and financial assets and liabilities components, we see the negative correlation is driven by housing assets and financial liabilities (mainly mortgage loans for households). Indeed, household financial assets are surprisingly not significantly correlated with the net international investment position. Similarly, if we look at the net international debt and equity positions, we see that household wealth is also negatively associated with the net international debt position also through its housing components (assets and liabilities). This gives further evidence that real estate dynamics and external vulnerabilities are strongly linked.

In turn, these findings have implications for macro-prudential policy frameworks and the monitoring of excessive imbalance. Overall, the main channel of the negative relationship between household wealth and the external balance operates through valuation adjustments of household wealth (particularly on housing assets) and the net international debt (and particularly net other investment) position. This gives suggestive evidence of a collateral effect, where households tend to "over-borrow" when faced with an increase in the value of their (net) assets. The accumulation of net international debt liabilities could create potential vulnerabilities in cases of shocks, given the non-state-contingent nature of debt. Moreover, it is the net other investment category of the external debt balance that drives the results, indicating an important role of bank loans and cross-border banking and a possible motivation for macroprudential measures. Accordingly, particular attention should be given to increases in household wealth - especially due to capital gains- in order to enable policymakers and regulators to identify and monitor the buildup of vulnerabilities and enact the appropriate macroprudential policies.

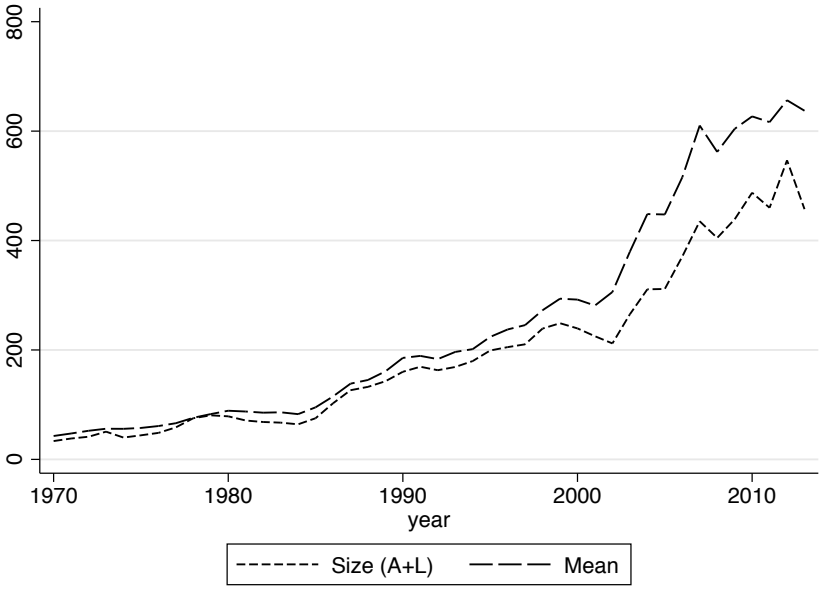
Due to the limitations of the data, we can only look at the covariation patterns in an indirect manner. Future extensions will look to build upon the recent advances in data collection of

net external exposures of different sectors of the economy and the increasing availability of bilateral data. Additionally, another angle that merits more investigation is the distributional issues arising from the rise in household wealth and their link with the external balance. Indeed, in our setup, we capture the average effect of aggregate wealth swings. However, the distribution of wealth varies over time and between different types of people, who are more or less financially constraint or have a different marginal propensity to consume for instance. In turn, this could lead to heterogeneous effects on the external balance of an economy. The growing data on the distribution of wealth should help disentangle the conflicting effects across income group.

Figure 3.1: Household and International Balance Sheets

(a) Household Balance Sheet Size (Assets + Liabilities)

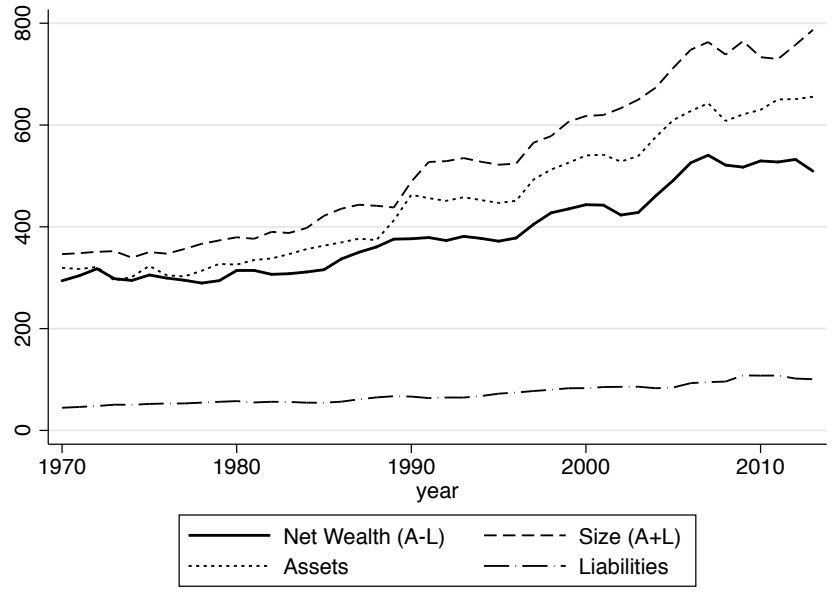
(b) International Balance Sheet Size (Assets + Liabilities)



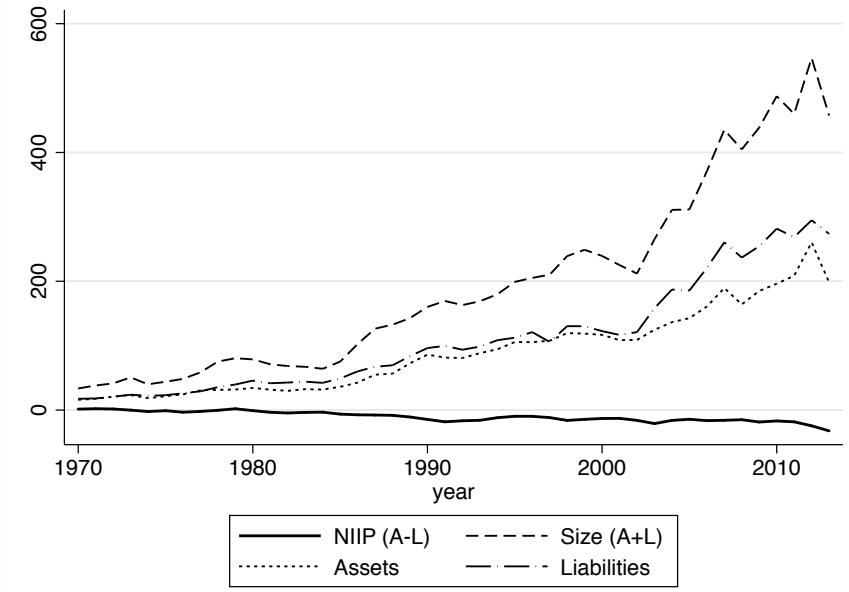
Note: Mean and median values for sample of countries, in percent of national income. Household assets comprise of the market value of financial assets (currency, deposits, bonds and loans, equities and fund shares and life insurance and pension fund holdings) and non-financial assets (dwellings, the underlying land, agricultural land and other domestic capital such as offices, structures, machines, patents for instance) and financial liabilities (mostly mortgages). The international balance sheet is the sum of foreign assets and liabilities of a country evaluated at market value.

Figure 3.2: Household and International Assets and Liabilities

(a) Household Balance Sheet

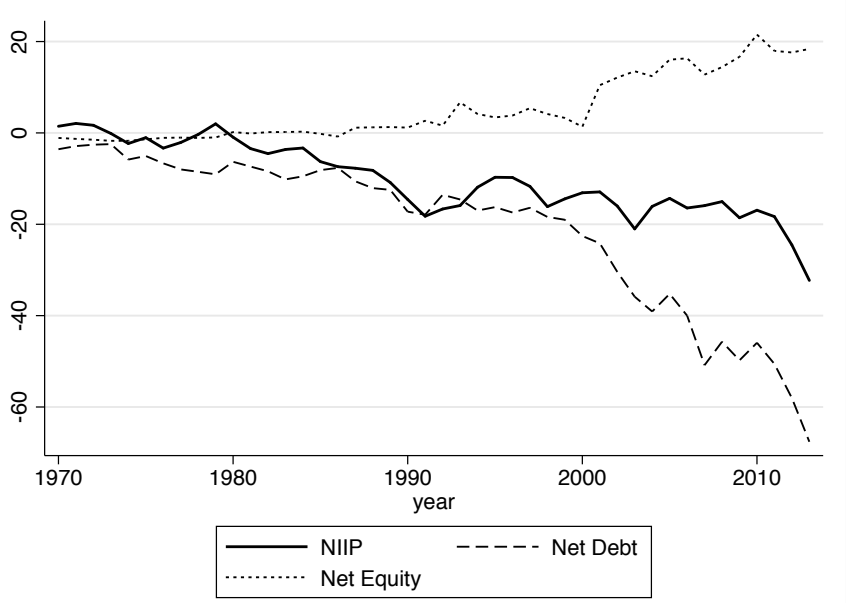


(b) International Balance Sheet



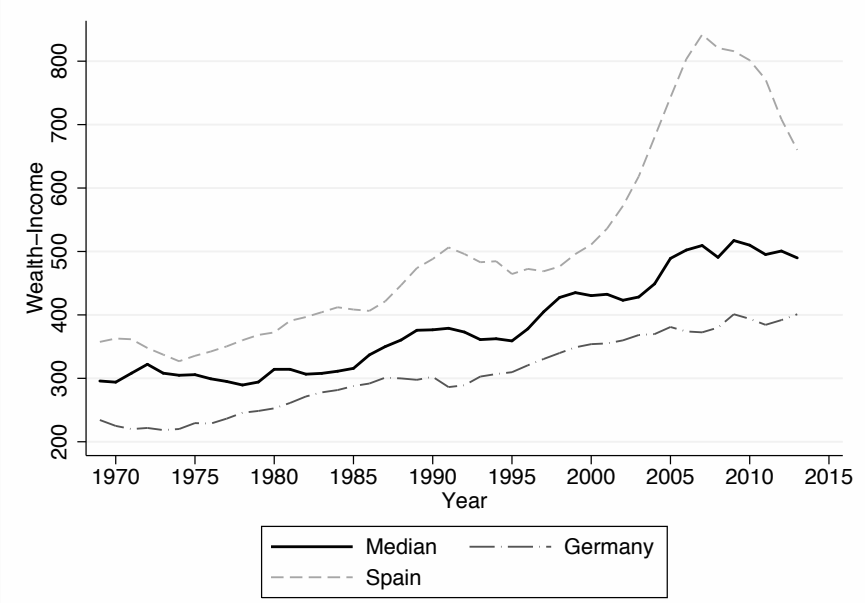
Note: Mean and median values for sample of countries, in percent of national income. Household assets comprise of the market value of financial assets (currency, deposits, bonds and loans, equities and fund shares and life insurance and pension fund holdings) and non-financial assets (dwellings, the underlying land, agricultural land and other domestic capital such as offices, structures, machines, patents for instance) and financial liabilities (mostly mortgages). The international balance sheet is the sum of foreign assets and liabilities of a country evaluated at market value.

Figure 3.3: Net International Debt and Equity Positions



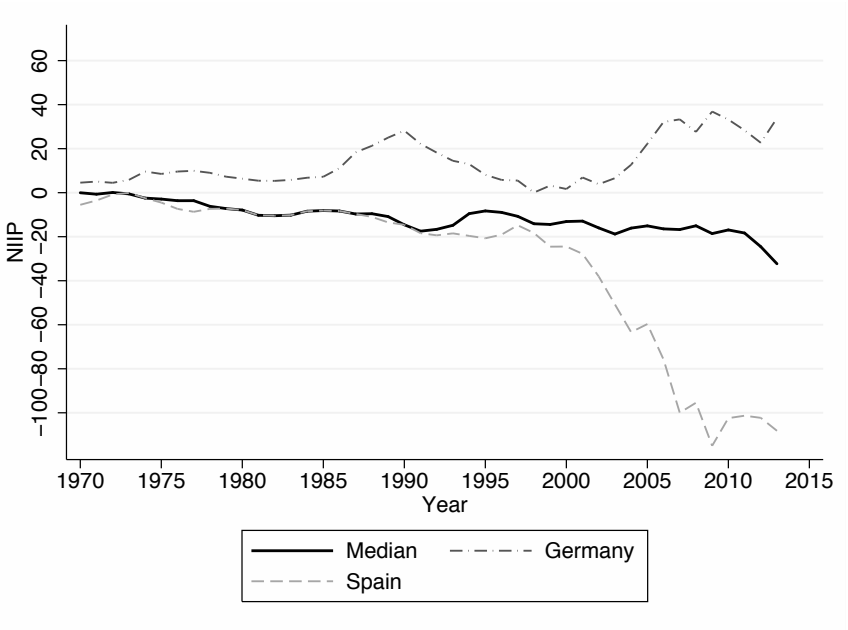
Note: Median values for sample of countries, in percent of national income.The Net Debt Position is the difference between international debt assets and international debt liabilities. The Net Equity Position is the difference between international equity assets and international equity liabilities.

Figure 3.4: Net Household Wealth



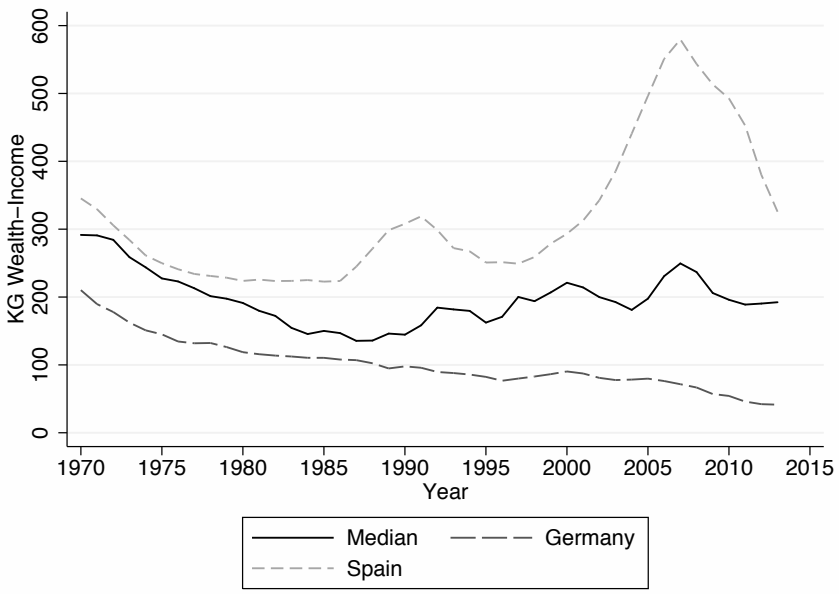
Note: Median, maximum and minimum values of net household wealth. In percent of national income.

Figure 3.5: Net International Investment Position



Note: Median, maximum and minimum values of the net international investment position. In percent of national income.

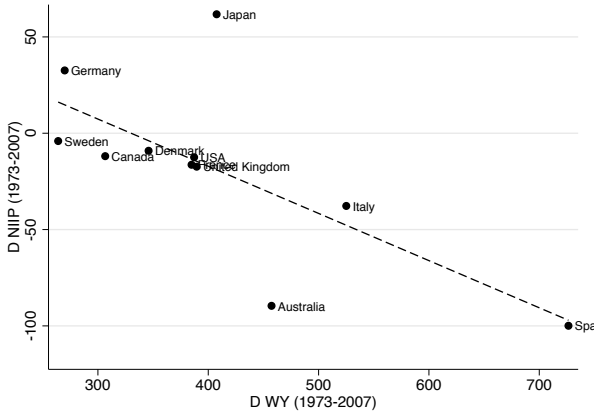
Figure 3.6: Capital Gains Household Wealth



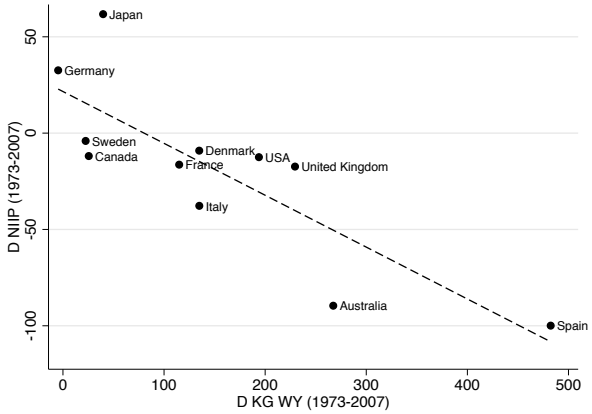
Note: Median, maximum and minimum values of capital gains household wealth. In percent of national income. The capital gains household wealth is the initial wealth-income ratio plus the cumulated capital gains.

Figure 3.7: Unconditional Correlations: Household and International Wealth

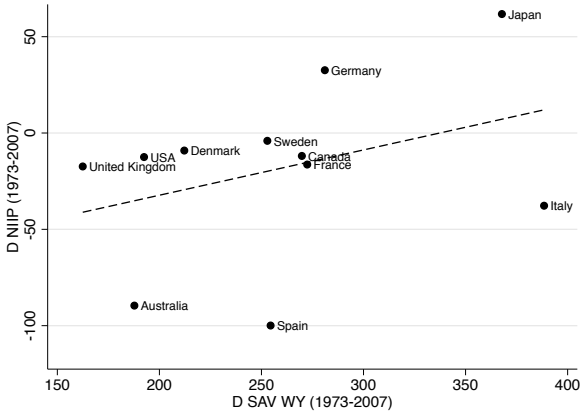
(a) Household Wealth & NIIP



(b) Capital Gains Wealth-Income & NIIP



(c) Saving Wealth-Income & NIIP



Note: Unconditional correlations between the change in NIIP and the change in household wealth, capital gains induced household wealth and saving induced wealth. In percent of national income.

Table 3.1: Household Wealth Decomposition 1980-2007

	Country	**1980**	**2007**	**Δ1980-2007**	**ΔSaving**	**ΔResidual**
Valuation Gains	USA	337	509	172	-63	89
	UK	291	541	250	-5	130
	Denmark	207	438	232	85	74
	France	314	545	231	113	58
	Italy	317	646	329	186	74
	Spain	372	842	470	0	356
	Australia	338	581	243	-69	178
Valuation Losses	Sweden	216	358	142	98	-38
	Canada	264	402	137	64	-56
	Japan	434	578	145	134	-80
	Germany	253	373	120	96	-47
	1st Quartile	278	420	144	-26	-14
	Median	317	541	231	64	74
	3rd Quartile	355	580	247	106	120

Note: Δ Savings is the percentage point difference between the savings induced wealth income ratio 1980-2007 and Δ residual is the point difference of the capital gains induced wealth income ratio. The initial date for the decomposition of the wealth accumulation is 1970.

Table 3.2: International Wealth Decomposition 1980-2007

Country	**1980**	**2007**	**Δ1980-2007**	**ΔCA**	**ΔSFA**
USA	5.8	-12.2	-18.0	-55.8	37.9
UK	7.0	-16.9	-23.9	-26.0	2.1
Denmark	-48.6	-12.2	36.4	63.6	-27.2
France	4.3	-16.5	-20.8	12.4	-33.2
Sweden	-17.3	-3.7	13.6	72.4	-58.8
Canada	-41.9	-15.9	26.0	20.1	5.9
Japan	1.2	62.0	60.8	72.1	-11.2
Germany	6.4	33.3	26.9	27.6	-0.6
Italy	-0.9	-37.8	-36.9	0.0	-36.9
Spain	-7.9	-100.0	-92.1	-45.0	-47.1
Australia	-37.5	-91.1	-53.6	-60.9	7.3
1st Quartile	-39.7	-27.4	-30.4	-35.5	-35.1
Median	-0.9	-15.9	-18.0	12.4	-11.2
3rd Quartile	5.1	-8.0	26.5	45.6	4.0

Note: Δ CA is the percentage point difference between the notional NIIP constructed as the cumulated current account balances 1980-2007 and Δ SFA is the point difference of the valuation induced NIIP. The initial date for decomposition of the NIIP is 1970.

Table 3.3: OLS-Main Specification: Annual Sample 1971-2013

	(1) ΔNIIP	(2) ΔNIIP	(3) ΔNIIP	(4) CA	(5) CA	(6) CA
Lag Δ Wealth-Income	-0.071***			-0.036***		
	(0.022)			(0.013)		
Lag Δ Sav Wealth-Income		0.083			0.280***	
		(0.094)			(0.049)	
Lag Δ KG Wealth-Income			-0.080***			-0.047***
			(0.022)			(0.013)
Ageing Rate	0.160***	0.146***	0.159***	0.203***	0.196***	0.202***
	(0.036)	(0.037)	(0.036)	(0.020)	(0.019)	(0.020)
Income per capita	-0.775	0.102	-0.521	-0.932**	0.236	-0.818*
	(0.684)	(0.769)	(0.678)	(0.436)	(0.471)	(0.435)
Δ Public Debt	-0.061	0.057	-0.072	-0.176***	-0.137***	-0.189***
	(0.072)	(0.083)	(0.073)	(0.041)	(0.037)	(0.042)
Observations	531	533	532	531	533	532
Adjusted R^2	0.06	0.03	0.07	0.17	0.21	0.19

OLS regression with robust standard errors in parentheses. The dependent variable is the change in NIIP from col (1)-(3) and the current account balance from (4)-(6). The wealth-income ratio is decomposed into a savings induced accumulation and capital gains accumulation. All stock variables are in changes. Income per capita is real USD national income per capita and is in natural logs. All variables are in percent of National Income. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.4: OLS-Wealth Components Annual Sample 1971-2013

	(1) ΔNIIP	(2) ΔNIIP	(3) ΔNIIP	(4) CA	(5) CA	(6) CA
Lag Δ Housing Assets	-0.125***			-0.086***		
	(0.033)			(0.016)		
Lag Δ Financial Assets		0.005			0.015	
		(0.039)			(0.021)	
Lag Δ Financial Liabilities			-0.341**			-0.381***
			(0.145)			(0.077)
Ageing Rate	0.149***	0.148***	0.164***	0.203***	0.198***	0.216***
	(0.036)	(0.037)	(0.038)	(0.019)	(0.020)	(0.020)
Income per capita	-0.558	-0.134	-0.189	-0.786*	-0.321	-0.398
	(0.704)	(0.696)	(0.700)	(0.445)	(0.440)	(0.449)
Δ Public Debt	-0.062	0.056	-0.011	-0.157***	-0.113***	-0.192***
	(0.070)	(0.082)	(0.100)	(0.037)	(0.039)	(0.051)
Observations	483	529	529	483	529	529
Adjusted R^2	0.09	0.03	0.05	0.23	0.14	0.21

OLS regressions on yearly sample. All variables are in % of National Income. Robust standard errors in parentheses. The dependent variable is the change in NIIP from col (1)-(3) and the current account balance from (4)-(6). The wealth-income ratio is decomposed into its subcomponents housing assets, financial assets and liabilities. All stock variables are in changes. Income per capita is real USD national income per capita and is in natural logs. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.5: OLS- NIIP Breakdown Annual Sample 1971-2013

	(1) ΔNet Equity	(2) ΔNet Equity	(3) ΔNet Equity	(4) ΔNet Debt	(5) ΔNet Debt	(6) ΔNet Debt
Lag Δ Wealth-Income	0.003			-0.062***		
	(0.013)			(0.016)		
Lag Δ Sav Wealth-Income		-0.021			0.092	
		(0.071)			(0.076)	
Lag Δ KG Wealth-Income			0.000			-0.067***
			(0.014)			(0.017)
Ageing Rate	0.104**	0.102**	0.104**	0.031	0.020	0.030
	(0.045)	(0.044)	(0.045)	(0.042)	(0.042)	(0.042)
Income per capita	2.129***	2.122***	2.115***	-2.749***	-1.964***	-2.525***
	(0.636)	(0.732)	(0.640)	(0.591)	(0.752)	(0.596)
Δ Public Debt	-0.086	-0.072	-0.090	0.025	0.118*	0.019
	(0.066)	(0.062)	(0.068)	(0.061)	(0.065)	(0.062)
Observations	531	533	532	531	533	532
Adjusted R^2	0.02	0.02	0.02	0.05	0.02	0.05

OLS regressions on yearly sample. All variables are in % of National Income. Robust standard errors in parentheses. The dependent variable is the change in Net Foreign Equity from col (1)-(3) and the change in Net Foreign Debt from (4)-(6). The wealth-income ratio is decomposed into a savings induced accumulation and capital gains accumulation. All stock variables are in changes. Income per capita is real USD national income per capita and is in natural logs. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

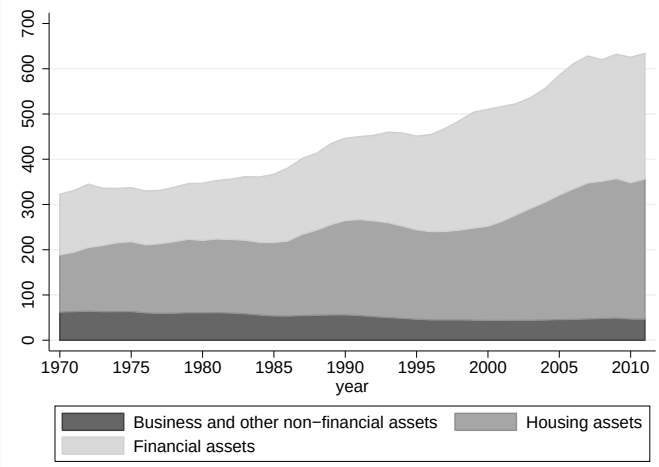
Table 3.6: Robustness Checks

Model Specifications	**Estimated Coefficient**		
	Δ Wealth-Income	Δ Sav Wealth-Income	Δ KG Wealth-Income
No Controls	-0.069^{***}	0.098	-0.078^{***}
SE clustered by country	-0.071^{***}	0.083	-0.080^{***}
SE clustered by year	-0.071^{**}	0.083	-0.080^{***}
SE HAC robust	-0.071^{***}	0.083	-0.080^{***}
Decomposition 1980	-0.073^{***}	0.225^{*}	-0.082^{***}
Post 1990	-0.085^{***}	0.182	-0.097^{***}
Country FE	-0.070^{***}	-0.028	-0.076^{***}
2-year sample	-0.079^{***}	0.127	-0.086^{***}
3-year sample	-0.088^{***}	0.075	-0.095^{***}
4-year sample	-0.080^{**}	0.063	-0.094^{***}

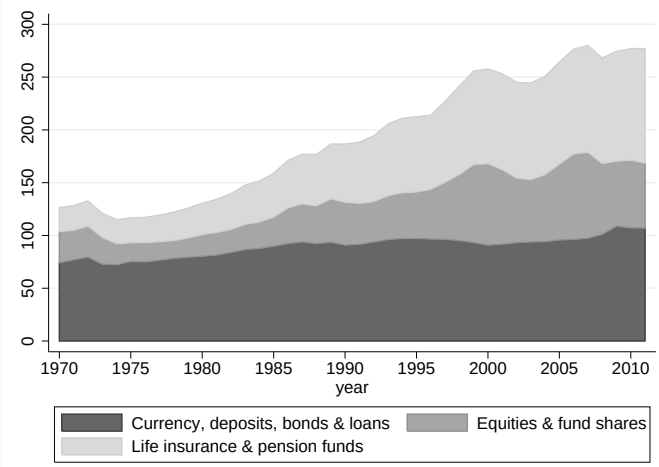
Note: OLS regressions with robust standard errors unless stated otherwise. Dependent variable is the change in NIIP. The Wealth-Income variables are lagged for line (1)-(8). For the 3-year and 4-year sample we use the contemporaneous wealth-income variable.

Figure 3.8: The Composition of Household Assets

(a) Household Assets



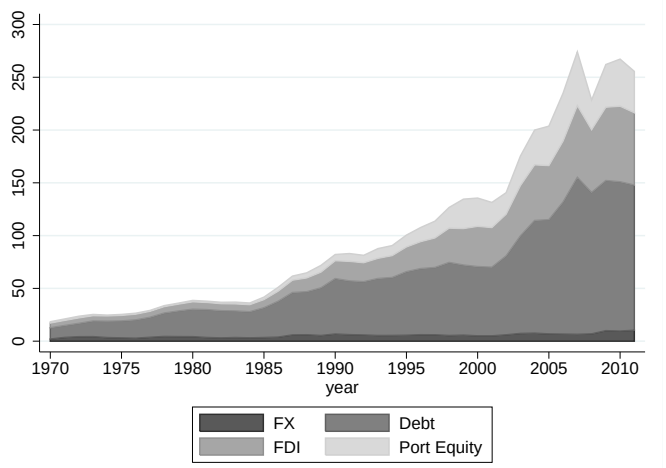
(b) Breakdown of Financial Assets



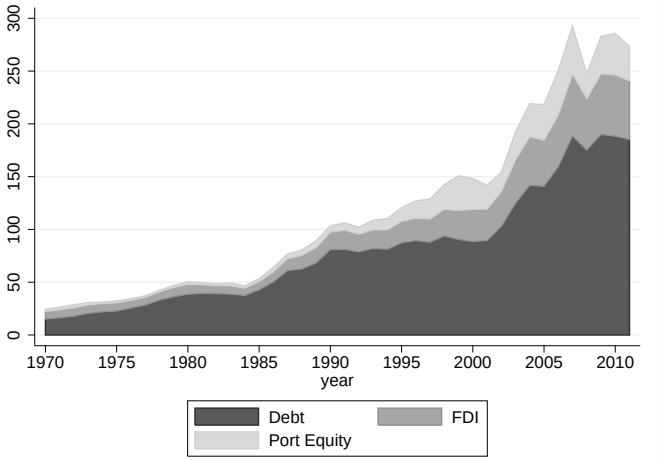
Mean values for sample of countries, in percent of national income. Assets are evaluated at market value. Business and other non-financial assets is constituted of agricultural land and other domestic capital such as offices, structures, machines, patents for instance. Housing is composed of dwellings and the underlying land. Financial assets are broken down into currency, deposits, bonds and loans, equities and fund shares and life insurance and pension fund holdings.

Figure 3.9: The Composition of International Assets and Liabilities

(a) International Assets



(b) International Liabilities



Note: Mean values for sample of countries, in percent of national income. FX: Foreign Exchange Reserves, Debt: Foreign Debt, FDI: Foreign Direct Investment, PEQ: Foreign Portfolio Equity.

Table 3.7: Robustness Checks: OLS-Split Sample Three Year Periods

	(1) Δ NIIP	(2) Δ NIIP	(3) Δ NIIP	(4) Cum CA	(5) Cum CA	(6) Cum CA
Δ Wealth-Income	-0.088***			-0.041**		
	(0.030)			(0.020)		
Cumulative Savings		0.075			0.188***	
		(0.077)			(0.057)	
Cumulative Capital Gains			-0.095***			-0.054***
			(0.030)			(0.020)
Aging	0.402***	0.390***	0.391***	0.634***	0.614***	0.629***
	(0.119)	(0.118)	(0.118)	(0.093)	(0.086)	(0.091)
Δ Public Debt	-0.223*	-0.061	-0.222*	-0.481***	-0.399***	-0.496***
	(0.119)	(0.100)	(0.117)	(0.102)	(0.086)	(0.102)
Relative Income	-1.584	-0.382	-0.705	1.276	3.155*	1.777
	(2.476)	(2.069)	(2.517)	(2.136)	(1.845)	(2.131)
Observations	169	188	169	169	188	169
Adjusted R^2	0.12	0.04	0.13	0.28	0.30	0.30

OLS regressions on a sample split into 3-year periods. In % National Income. Robust standard errors in parentheses. The dependent variable is the change in NIIP from col (1)-(3) and the cumulated current account balances from (4)-(6). Stock variables are differenced, flows are cumulated values and we take the average of Aging Rate and Relative Income. The wealth-income ratio is decomposed into a savings induced accumulation and capital gains accumulation. Relative Income in natural logs. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.8: OLS-Housing Breakdown Annual Sample 1971-2013

	(1) Δ NIIP	(2) Δ NIIP	(3) Δ NIIP	(4) CA	(5) CA	(6) CA
Lag Δ Housing Assets	-0.125***			-0.086***		
	(0.033)			(0.016)		
Lag Res Inv		-0.424***			-0.519***	
		(0.131)			(0.087)	
Lag Housing KG			-0.076**			-0.047***
			(0.030)			(0.015)
Aging Rate	0.149***	0.134***	0.141***	0.203***	0.189***	0.202***
	(0.036)	(0.037)	(0.037)	(0.019)	(0.019)	(0.020)
Income per capita	-0.558	0.621	-0.528	-0.786*	-0.062	-0.673
	(0.704)	(0.578)	(0.683)	(0.445)	(0.406)	(0.422)
Δ Public Debt	-0.062	0.071	-0.031	-0.157***	-0.087***	-0.129***
	(0.070)	(0.073)	(0.067)	(0.037)	(0.033)	(0.035)
Observations	483	593	494	483	588	494
Adjusted R^2	0.09	0.05	0.05	0.23	0.23	0.18

OLS regressions on yearly sample. All variables are in % of National Income. Robust standard errors in parentheses. The dependent variable is the change in NIIP from col (1)-(3) and the current account balance from (4)-(6). We assume a 1% housing depreciation rate (we also perform the regression with 0.5% and 1.5% rate). All stock variables are in changes. Res Inv is the flow of residential investment and Housing KG is the adjustment in valuation of the change in stock. Income is real USD national income per capita and is in natural logs. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Chapter 4

Retained Earnings and Global Imbalances

4.1 Introduction

The past few decades have seen a rise in retained corporate profit in advanced economies. At the same time, global firms and global investors have accumulated a growing share of the ownership of domestic firms. These trends have made the measurement of cross-border investment income considerably more difficult, in particular as statistical conventions have struggled to adapt to globalization.

This paper focuses on a particular implication of these trends: the distortions of cross-border investment income due to the attribution of retained earnings. Both the national accounts (UN, 2008) and balance of payments (IMF, 2009) make a distinction between investors with an ownership stake of 10 percent or higher, i.e. direct investors, and the others, called portfolio investors. In particular, the convention is to attribute income to direct investors as it is earned, whereas it is only attributed to portfolio investors as it is paid out in the form of dividends. The differential treatment is based on the idea that direct investors have a long-lasting relationship and control of the firm, and in this case, control of its saving decision. Typically, foreign direct investment (FDI) is associated with mergers and acquisitions or real capital expenditures. However, recent papers have highlighted that a growing share of FDI flows reflects primarily the complexity of the corporate structure of large multinational corporations (MNEs) and no longer decisions based on long-run factors.[1]

As FDI flows depart more and more from their traditional form, it is important to quantify the impact of the current accounting rules on measured flows. The tension between the accounting rules and these recent developments can result in distortions for highly globalized economies. This is particularly apparent when these economies are home to global firms (measured by FDI flows) often held by portfolio investors in the rest of the world (measured by portfolio flows). In turn, this can lead to a potential mismatch between inflows and outflows of income. While this issue can be offset by examining the adjustment of external balance sheets, it does mean that the measurement of key flow variables such as the current account and Gross National Income (GNI) are misleading. This is the focus of the paper.

Consider a country that is home to the headquarters of a large multinational firm with subsidiaries in the rest of the world. The income of these subsidiaries is allocated to the headquarters through the investment income in the balance of payments, improving the current account and the GNI of the country. Suppose the multinational is held by multiple portfolio investors from the rest of the world, as it is often the case for global firms.[2] If the firm

[1] Prominent examples include Blanchard and Acalin (2016), Damgaard and Elkjaer (2017), Torslov, Wier, and Zucman (2018), Lane and Milesi-Ferretti (2018) amongst others.

[2] In other words, none of these investors reach the 10 percent threshold of direct investment.

distributes the earnings, the funds will flow its foreign investors, deteriorating the current account by the same amount. However, if the firm retains its income, it will not be allocated to these investors and there will be no change in the current account. This can lead to the current account and the GNI of this country to be overstated. In addition, this can lead to inequality between the two countries that depends solely on the structure of its external balance sheet.

Lane (2017) argues that these measures of the underlying net resources of a country should be independent of the timing of firms' decision to pay out their profits. Building on this, this paper estimates the scale of the distortion of these accounting rules by reapportioning the undistributed income to portfolio investors. To this end, we build a framework using the national accounts and bilateral portfolio holdings for 35 (mostly advanced) economies over the 1995-2015 period. We follow a three-step procedure. First, we estimate the share of the domestic corporate sector, both listed and non-listed, owned by foreign portfolio investors. Second, we calculate the share of domestic corporate retained earnings that can be attributed to these investors. Third, using bilateral foreign portfolio holdings, we allocate this amount to each partner country. We need to take into account both the credit and the debit side of the country's external balance sheet, as the overall net correction will be the imputed retained earnings on portfolio assets minus liabilities. We use this measure to correct the current account and gross national income. Finally, as retained earnings increase the value of the firm, we use this measure to study the potential insights for portfolio valuation adjustments.

This correction leads to a significant redistribution of income between highly globalized economies. It varies across countries based on the scale and location of the international portfolio balance sheet and corporate retained earnings. We find the largest average negative corrections are in countries with very large negative net foreign portfolio asset positions. This is the case for Luxembourg, Japan, Korea, Ireland, and Switzerland for instance. This is not too surprising as Luxembourg and Ireland are major investment funds hubs. Ireland and Switzerland also are home to many headquarters of multinationals that are typically owned by foreign investors. Likewise, the largest positive corrections are in countries with creditor net foreign portfolio asset positions. This translates to average corrections larger than 2 percent of GDP for Norway, Singapore, the Netherlands, Canada, and Sweden. Singapore is another main financial center, whereas the Netherlands is both home to a large share of multinational headquarters and has large holdings of foreign portfolio assets. In turn, correcting for retained earnings of portfolio investors increases and decreases measured current account imbalances depending on the structure of the country's external balance sheet. Importantly, the large key surpluses of Switzerland and Germany are reduced by, on average, 2 and 1 percent of GDP respectively. However, imbalances are exacerbated in Norway and the Netherlands, by 8 and 2.5 percent of GDP respectively.

Next, our correction will also impact the growth of GNI, albeit at a smaller scale. We find large positive and negative correction episodes in a similar set of highly globalized countries. Finally, this will also allow us to shed light on the share of valuation changes on external portfolio balance sheets (measured in the stock-flow adjustment) due to current production, i.e. retained earnings, and other capital gains due to asset price changes. We find a considerable share of changes in portfolio valuations cannot be accounted for by retained earnings.

Taken together, our results show that treating direct and portfolio investors similarly can considerably modify key policy variables that are the current account and gross national income. Our results point towards caution in the interpretation of the current account. In a world with increasing cross-border holdings of portfolio assets and increasing corporate retained earnings, old statistical assumptions on the timing of the recording of income have an increasing impact of the measurement of flows. Our correction can give policymakers a better measure of the underlying net resources available to the country, notably measured by the current account balance, an essential tool for policy (Obstfeld, 2012).

It is important to stress that this distortion should be a "temporary" distortion in nature. At some point, these earnings should go to the shareholders. In addition, everything else equal, the value of a country's net international investment position (NIIP) should adjust in proportion. However, given the importance of the current account and GNI as policy variables, it is important to study the flow side. It should also be noted that there are other potential corrections that are possible. One direction is not to impute any flows and to treat domestic, foreign portfolio and foreign direct investors in a similar manner. However, a move away from market values might not be adapted to capture the net resources of countries. In addition, attributing all of the valuation gains and losses to the flow variables is not satisfactory as we are not distinguishing between valuation changes of wealth due to production (retained earnings) and due to windfall gains (a price change due to expectations changes or unforeseen changes in productivity or growth).

Our contribution is linked to the growing literature focusing on corporate saving, see Poterba (1987), Eggelte et al. (2014), Gruber and Kamin (2016), Chen, Karabarbounis, and Neiman (2017), and Cesaroni, De Bonis, and Infante (2018). It is also related to the debate surrounding the US's external position, see Gourinchas and Rey (2007a) and Lane and Milesi-Ferretti (2009). In addition, it follows Dalgaard, Eff, and Thomsen (2000) in calling for satellite accounts to get a satisfactory description of income distribution in the national accounts. It is also related to the recent papers that highlighted the distortionary effect global firms have had on the national accounts and balance of payments. Guvenen et al. (2017) show MNEs distort measures of value-added and productivity, leading to an underestimation of the GDP of the home country of the MNE and a corresponding overestimation of GDP in countries

hosting MNE. Lane (2015a) shows financial engineering may be at the source of the some of the deterioration in the measured current account of the UK and Avdjiev et al. (2018) documents the footprint of MNEs in the balance of payment statistics. In particular, a recent literature shows that FDI flows no longer reflect real capital expenditures, but the complex balance sheet management by large financial and non-financial corporations (see for instance Blanchard and Acalin (2016), Damgaard and Elkjaer (2017), Torslov, Wier, and Zucman (2018), Lane and Milesi-Ferretti (2018)).

This paper is complementary to the independent and contemporaneous work by IMF (2018a) and Fischer et al. (2019) who also correct the current account for retained earnings on portfolio equity. These papers use stock market data in order to estimate the correction. In this paper, we use national accounts data that encompass both listed and non-listed firms. Using stock-market data can be problematic for highly globalized economies, as large firms may not necessarily be listed in the country in question, like in Switzerland and Ireland, for instance. In addition, another connected paper is Hansen and Wagner (2018). The authors argue that retained earnings from FDI are different in nature to other capital flows and policymakers should take into account a current account balance without retained earnings.

The rest of this paper is structured in the following manner. First, we present the key national accounts identities and present our reapportioning method. Next, we document the rise in retained profits and foreign ownership in the corporate sector across advanced economies. In section 4, we present our adjusted measures of gross national income and the current account. Section 5 offers some concluding remarks.

4.2 Conceptual Framework

This section reviews the basic national accounts and balance of payment concepts that we use in this paper.[3] We will then illustrate the impact on key macro measures of the inconsistencies in the treatment between different investors in the national accounts. Finally, we will expose our method for reapportioning part of domestic retained earnings to portfolio investors.

4.2.1 National Accounting

We are interested in national account concepts related to the total economy and to the corporate sector in particular.

[3]For further information on the compilation of these accounts see UN (2008) and IMF (2009).

In relation to the total economy, as one of the contributions of this paper is to study the net investment income of a country, we see that it shows up in the calculation of both gross national income, which is equal to gross domestic product (GDP) plus the net investment income from abroad (NINC), and the current account (CA), which is equal to the trade balance (exports minus imports, X-M) plus the net investment income from abroad.[4]

$$\begin{aligned} GNI &= GDP + NINC \\ CA &= (X - M) + NINC \end{aligned} \tag{4.1}$$

The net investment income balance can be decomposed into the income received from assets minus the income paid on liabilities for the different asset classes (foreign direct investment, $NINC^{FDI}$; portfolio investment, $NINC^{PI}$; and other investment, $NINC^{OTH}$), in the following manner:

$$NINC = NINC^{FDI} + NINC^{PI} + NINC^{OTH} \tag{4.2}$$

Direct investment is the relationship between a resident enterprise and a non-resident foreign investor which owns 10 percent or more of the ordinary shares or voting power of an incorporated enterprise (or equivalent). In practice, it is the relationship between affiliates (subsidiaries and parents) or associates, i.e. MNEs. Investors are said to have a certain influence over decisions due to their lasting relationship. On the other hand, portfolio investment is all the cross-border transactions and positions involving debt or equity securities, other than those included in direct investment or reserve assets (IMF, 2009).

The distinction between the type of investors is crucial when it comes to the timing of the allocation of earnings in the national accounts. Earnings of direct investment enterprises which are not distributed as dividends to direct investors are called reinvested earnings. The IMF records reinvested earnings as being distributed to direct investors in proportion to their equity ownership and then being reinvested into the same firm. They are recorded in the current account as income on direct investment and in the financial account as a transaction in equity. The underlying rationale is to allocate corporate saving to the shareholders of the firm. The decision to retain some of its earnings within the firm is said to represent a deliberate investment decision on the part of the foreign direct investor. As the earnings are available to the firm for its use, they are deemed to be reinvested in the firm. In the case of portfolio investment (and domestic investment), retained earnings are not assigned to shareholders as income. Portfolio investors are seen to have little influence on the management of an enterprise and therefore have little input into the firm's saving decisions.[5] Portfolio

[4] To be more precise it is the trade balance plus net factor income, that includes income from labor and capital. In practice, net labor income is relatively small in advanced economies.

[5] In addition, earnings attributed to domestic investors are also on a cash basis, creating similar implications for the distribution of income between sectors within countries.

investors' undistributed earnings are recorded as the saving of the enterprise and the increase in the value of the enterprise is recorded in the national accounts as a revaluation. However, concerning investment funds, regarded as portfolio investment in the balance of payments, their undistributed earnings are deemed to be distributed, in a similar manner to direct investors.

Net investment income can further be decomposed into equity and debt. Our focus is on the equity component of the net investment income for director investors ($NDIV^{FDIAEQ}$) and portfolio investors ($NDIV^{PIEQ}$). Abstracting for investment funds, we see that:

$$\begin{aligned} NINC^{FDIEQ} &= NDIV^{FDIAEQ} + NRE^{FDIEQ} \\ NINC^{PIEQ} &= NDIV^{PIEQ} \end{aligned} \tag{4.3}$$

with $NDIV$ the net dividends paid and NRE the net retained earnings. However, this creates inconsistencies as this principle is not extended to cross-border portfolio investment and domestic resident-to-resident investment relationships. These inconstancies show up in the savings of firms, in gross national income and the current account. These distortions are magnified by the fact that these retained earnings accrue to MNEs, as a large share of the ownership of MNEs is by foreign investors.

Next, we have to account for the income of investment fund shareholders, including mutual funds and unit trusts. This income is regarded as portfolio investment in the balance of payments. However, their undistributed earnings are deemed to be distributed, in a similar manner to direct investors. Earnings from investment funds are said to be viewed as being passed on to their shareholders in the form of investment income on their equity as they are earned. This leaves the investment fund with no saving. We adjust our net correction measure in order to not double count this income.[6]

In the national accounts, the profits of firms are measured by the corporate operating surplus (GOS).[7] Part of this return is used to pay interest to lenders, and to pay corporate taxes (measured in *other*). Another part is attributed to FDI investors (NRE^{FDI}). The residual is the accounting profits that can either be distributed to shareholders in the form of dividends ($NDIV$) or retained in the firm. The later retained earnings constitute the corporate sector's

[6]More precisely, shareholders' income is defined as the investment income earned on the fund's investment portfolio after deducting operating expenses. If some of the income is retained, it should be treated as if it were distributed to the shareholders and then deemed reinvested. This covers (collective) investment fund shareholders, including mutual funds and unit trusts. See paragraph 11.37 in IMF (2009).

[7]Gross operating surplus of the NFC sector is income after subtracting compensation of employees and taxes on production and imports less subsidies from gross value added.

saving (GS). Corporate saving represents an internal source of funds available to firms to either invest in non-financial or financial assets or to reduce debt.

$$GOS = GS + NDIV - NRE^{FDI} + other \tag{4.4}$$

Finally, an additional implication of the current treatment of net investment income concerns the valuation adjustments to external wealth. We can decompose the change in the net international investment position (NIIP) between t and $t-1$ in the following manner:[8]

$$NIIP_t - NIIP_{t-1} = CA_t + SFA_t \tag{4.5}$$

where SFA_t is the Stock-Flow Adjustment term, is often used as a proxy for revaluation changes. The Stock-Flow Adjustment term is composed of a valuation term, KG_t, the net capital gain on the existing holdings of foreign assets and liabilities, and a term capturing net other non-flow changes to the net international investment position, $OTHER_t$, (for example, due to changes in reporting methods and data revisions).[9] In addition, as noted above, part of the change in stock not captured by the current account is due to retained earnings on portfolio investments, RE_t^{PI} (equal to a proportional change in the net stock of portfolio investment everything else equal). However, these capital gains are in nature very different from windfall capital gains. Thus, teasing out the part that is due to retained earnings on portfolio investment can potentially improve our understanding of external valuation adjustments.[10]

$$SFA_t = KG_t + OTHER_t + RE_t^{PI} \tag{4.6}$$

4.2.2 Reapportioning Method

In order to have a consistent treatment across types of firms and investors, we impute retained earnings to portfolio investors and reapportion the resulting income to the country of residence

[8] We have $FA_t = -(CA_t + KA_t + EO_t)$. FA_t is the financial account balance, KA_t pertains to the capital account balance and EO_t is the net errors and omissions. For simplicity, we assume KA_t and EO_t are equal to 0.

[9] See Curcuru, Thomas, and Warnock (2009) for further discussion on the importance of the net other statistical term.

[10] There is an important conceptual difference between increases in the share price due to expected retained earnings and unexpected shocks to the share price. Merging these two concepts could be problematic. The large share of the revaluation account is holding gains of the windfall nature. However, in the past few years, retained earnings have grown in importance.

of the investor.[11] As portfolio investment is present of both sides of the balance sheet, we need to take into account both credit and debit flows. We follow a three-step procedure. First, we estimate the share of the domestic corporate sector, both listed and non-listed, owned by foreign portfolio investors. Second, we calculate the share of domestic corporate retained earnings that can be attributed to these investors. Third, using bilateral foreign portfolio holdings, we allocate this amount to each partner country. We need to take into account both the credit and the debit side of the country's external balance sheet, as the overall net correction will be the imputed retained earnings on portfolio assets minus liabilities.

Let us take country i, for instance. We estimate the imputed retained earnings of attributed to foreign portfolio investors on the liability side, λ_{it}^{L}. First, we calculate the share of portfolio equity liabilities ($PEQL_i$) in the total outstanding stock of domestic equities liabilities (EQ_i).[12] Next, we multiply by the total retained earnings firms (measured by gross savings of corporates, that is after-tax profits less dividends to shareholders, GS_i).[13]

$$\lambda_{i,t}^{L} = \frac{PEQL_{i,t-1}}{EQ_{i,t-1}} * GS_{i,t} \tag{4.7}$$

Next, we use the IMF's Coordinated Portfolio Investment Survey (CPIS) that collects data on bilateral holdings of portfolio investment securities to construct holding weights between country pairs. We concentrate on the holdings of equity and investment fund shares. Using this, we can construct weights from both portfolio equity assets and liabilities holdings. For allocating retained earnings from country i to j, we use the share of foreign liabilities to country j relative to all foreign liabilities of country i, ω_j^i.

$$\omega_j^i = \frac{PEQL_j^i}{PEQL_i} \tag{4.8}$$

We can then reallocate the retained earnings (λ^L) according to their share in the total portfolio equity liabilities holdings (ω_j^i).

Likewise, on the asset side of the current account of country i, we want to allocate its share of retained earnings in all other countries (λ_i^A). To do this, we compute the share of portfolio

[11] We can also impute the remaining profits to resident investors (i.e. the government and the household sector).

[12] The outstanding stock of domestic equities liabilities captures the equity value of the domestic corporate sector. It is constituted of both listed and non-listed firms. We find a median share of approximately 10 percent of the domestic corporate sector, both listed and non-listed firms, to be owned by foreign portfolio investors, roughly in line with the estimates for the United States in Rosenthal (2017).

[13] The underlying assumption is that gross saving is approximately distributed across direct investors and portfolio investors according to the ownership shares.

equity liabilities of country j in i (ω_i^j).[14] Next, we estimate the dollar amount of portfolio equity liabilities of country j in i by multiplying ω_i^j by the retained earnings on portfolio liabilities for country j. We then take the aggregate for all partner countries of country i. The resulting estimate is equal to the imputed portfolio income on the asset side for country i (λ_i^A).

$$\lambda_i^A = \sum \omega_i^j * \lambda_j^L \tag{4.9}$$

Finally, we have to account for the income of investment fund shareholders, including mutual funds and unit trusts. This income is treated is a similar manner to FDI, as discussed in the previous section. We adjust our net correction measure by subtracting the net retained earnings for funds, λ^F.[15] We then take the difference in order to compute our net correction λ^{NET} for country i.

$$\lambda^{NET} = \lambda^A - \lambda^L + \lambda^F \tag{4.10}$$

By way of illustration, let us take the 2013-2015 period in Japan. The ownership of the domestic corporate sector of foreign portfolio investors stood at 16.3 percent. In addition, its gross corporate saving was 23.1 percent of GDP. This means the imputed retained earnings of attributed to foreign portfolio investors, λ_{JPN}^L is equal to approximately 3.6 percent of GDP (16.3*23.1≈3.6). On the asset side, we allocate 0.7 percent of GDP to Japan (λ_{JPN}^A). After subtracting the retained earnings of funds (0.9 percent of GDP), we find a net correction of -2 percent of GDP for Japan, that is λ^{NET}=(λ^A-λ^L-λ^F)=(0.7-3.6+0.9)=-2.0.

Given that our sample of countries does not cover the world economy, there is a potential downward bias of the credit side of the correction for portfolio retained earnings. Indeed, we rely on the available data concerning the host country of the portfolio investment asset. This, in turn, might overestimate the negative impact on the current account, gross national income, and other measures. However, our sample covers a large share of the partner countries in the country's portfolio.[16] Most of the missing partner country data is from tax havens, like the Cayman Islands or Bermuda, for instance. In order to see how this data could bias our results, we calculate the retained earnings on portfolio investors the Cayman Islands. Next, we allocate these estimates to the holders of foreign portfolio assets in the Cayman Islands according to their shares in the aggregate balance sheet of the tax haven. The purpose of this correction is to treat the assets of the tax haven as if they belonged to the investors in the haven. Overall, correcting for the holdings of the Cayman Islands does significantly change the results.

[14] Or, alternatively, the share of portfolio equity assets of country i in j.
[15] λ^F is calculated from the perspective of the shareholder. Thus, it comes in with a positive value.
[16] See Table 4.4 for details.

4.3 Stylized Facts

This section describes the evolution of corporate earnings and foreign ownership in the past few decades in our sample of countries. Since the focus of this paper is the attribution of retained earnings to portfolio investors, we will pay particular attention to profit retained within the firm, i.e gross saving, and the share of portfolio investors in the economy.

Figure 4.1 shows a marked increase in corporate earnings (distributed and retained) in the past few decades. The median profit to GDP increased from 20 percent to over 26 percent of GDP since 1995. This has led to an increase in both distributed (a doubling of the dividends) and undistributed profits (gross saving).

The cyclical variation between pre-crisis boom and busts is apparent in the graph. There were increases in gross saving in run-up and after dot com bubble, then decrease run-up to the global financial crisis. Crucially, gross saving captures the external profits of domestically-resident multinational firms but also domestic profits of domestically-resident multinational firms (which are often held by foreign investors in the form of portfolio investment). Dividends are less volatile and have an increasing trend since the beginning of the sample. However, there remains considerable cross-country heterogeneity. If we classify countries into high and low corporate saving groups depending on if they are above or below the median, we see notable differences. There have been large increases between the 2000-2007 period and the 2011-2015 period in some countries (the Netherlands, Italy, Bulgaria, Hungary, and Portugal for instance) and decreases in others (for example in Sweden, Switzerland, Finland).[17]

Next, we turn to the change in the share of foreign holdings of the domestic corporate sector. Figure 4.2 shows that the median share of foreign ownership of domestic equities has increased from under 20 percent to over 30 percent since 1995. We estimate this by taking the share of foreign equity liabilities (from the International Investment Position (IIP) data) in the total outstanding stock of domestic equities liabilities (from the national accounts). Foreign investors can be broken down into two types of investors depending on their ownership share. Direct investment has increased from under 10 percent of GDP to just under 20 percent (with the 75th percentile reaching over 40 percent of GDP). Portfolio investment increased from under 5 percent to under 10 percent of GDP. In terms of flows, this translates into an increase in the share of domestic profit flowing abroad. Overall, foreign ownership has stabilized since the onset of the global financial crisis. There is considerable cross-country heterogeneity in terms of the level of foreign ownership. Importantly, in the United States foreign ownership

[17] See Table 4.6 for more details.

is relatively low and stands at less than 18 percent of domestic equity in 2015. However, in Ireland, Cyprus, Malta, and the Netherlands it is over 70 percent.[18]

Using the shares of direct and portfolio investors in domestic equity, we can estimate the share of gross saving that should be attributed to both types of investors. We note that the shares for both types of investors were very similar in the lead-up to the dot-com crisis, with the direct investment share surging since then. [19]

In summary, while most advanced economies have experienced increases in profits to GDP and increases in foreign holdings of these profits, the quantitative scale varies across countries. As noted above, since retained income held by portfolio investors are not allocated to foreign investors in the flow measurement of cross-border income, these trends point towards an increase in the distortions of two key policy variables: the current account and gross national income. The next section will present our corrected versions of these measures.

4.4 Adjustment Results

As described above, we follow the three-step procedure. We first present the net value of our correction. Next, we adjust measures of the current account balance and gross national income. Finally, we study its potential insights for portfolio valuation adjustments.

4.4.1 The Net Correction

Our estimates of retained earnings attributed to foreign portfolio investors vary across countries based on the scale of the international (portfolio) balance sheet and the scale of corporate retained earnings. It leads to a significant redistribution of income in highly globalized economies and relative relatively low corrections in other countries.

The average net correction is shown in Figure 4.3 for the period 2013-2015.[20] The largest negative corrections are in countries with very large negative average net foreign portfolio asset positions. For the sake of presentation, we have omitted Luxembourg from the graph, whose average net correction amounts to -23.5 percent of GDP. This is the largest negative correction we estimate. This is due to Luxembourg being the main hub for investment funds

[18] Table 4.7 documents these trends in more detail.
[19] Figure 4.7 shows the median share of gross saving that can be allocated to direct and portfolio investors.
[20] Figure 4.8 and Figure 4.9 for 2010-2012 and 2006-2008 respectively.

in the European Union.[21] In terms of large negative corrections, Japan, Korea, Ireland, and Switzerland all have average corrections larger than 2 percent of GDP. Ireland and Switzerland are home to many headquarters of multinationals that are typically owned by foreign investors. These multinationals earn income both domestically and abroad. This income is attributed to the Irish or Swiss corporate sector. If this income is retained, it will not be attributed to the foreign portfolio owners of these multinationals. These countries have very large negative average net foreign portfolio asset positions (ranging from -3048 percent of GDP for Luxembourg to -5.5 percent of GDP for Japan).[22] This group of countries also tends to have high levels of corporate saving. Moreover, Table 4.1 shows the breakdown between asset, liabilities, and investment funds. We see that most of the correction on the asset side for Luxembourg and Ireland are already accounted for in the retained earnings for investment funds, where, like for direct investors, all income is assigned to the investors distributed or not.

In relation to large positive corrections, countries with the large positive net foreign portfolio positions have the largest corrections. Norway leads the way with an average of 7.9 percent of GDP. Norway is home to the largest sovereign wealth fund and has the largest positive net foreign portfolio asset position (over 113 percent of GDP on average over the 2013-2015 period). Singapore, the Netherlands, Canada, and Sweden complete the top 5. Singapore acts as a main financial center, whereas the Netherlands is both home to a large share of multinational headquarters and has large holdings of foreign portfolio assets.[23] To the extent that Sweden also is home to many MNEs, we may be surprised by the positive correction. However, Sweden has a considerable positive net portfolio equity balance (approximately 25 percent of GDP), which dominates the outflow to investors. Moreover, countries with large positive net portfolio holdings (especially in countries with high corporate gross saving) tend to report larger positive corrections.[24]

The tension between the income of FDI assets (both distributed and retained income) and the debit of income related to portfolio holdings can lead to a distorting picture of net resources available to countries. Figure 4.4 shows the cross-country relationship between the average income from FDI assets coming in and the income allocated to portfolio investors between 2013 and 2015. We measure the income allocated to portfolio investors with no correction, in other words, income distributed through dividends, and with our correction, dividends, and retained earnings. We see the relationship can change significantly, with payments to foreigners matching income received in a lot of cases.

[21] Typically, foreigners invest in funds located in Luxembourg. These funds then purchase equity and bonds in the rest of the world.

[22] See Table 4.5.

[23] A large share of assets managed by pension funds and insurers for households are invested abroad in the Netherlands (Eggelte et al., 2014).

[24] Table 4.5 shows the relationship with gross saving and the net portfolio position for the top 10

A limitation of our exercise is that we do not have data for some key financial havens where a considerable share of cross-border portfolio holdings is booked. These financial havens do not publish detailed national accounts data. To correct for this, we can adjust for foreign assets in key financial havens. Given the structure of these economies, we proceed by allocating the haven's share in bilateral portfolio asset holdings vis-a-vis the rest of the world to the debtors of the haven. For instance, let's take the Cayman Islands, which represents the largest destination country of US portfolio holdings in 2015 (14 percent of total holdings) and 36 percent of Japanese portfolio holdings. We calculate the bilateral asset holdings of the Cayman Islands vis-a-vis of other countries and allocate them to the US, Japan, and the other countries that hold assets in the Cayman Islands based on their share in the aggregate. The results do not change much.[25]

Finally, Figure 4.5 shows that the distribution of the average correction does not change much over time. It plots the cross-country cumulative distribution of the average correction for the periods 2013-2015, 2010-2012, and 2006-2008. As with the previous graphs, we omit Luxembourg and Ireland from the graphical representation.

To summarize, we find the largest average negative corrections are in countries with very large negative net foreign portfolio asset positions. Likewise, the largest positive corrections are in countries with creditor net foreign portfolio asset positions.

4.4.2 Adjusted Macro Statistics and Valuation Changes

These corrections are important because they change key policy variables: the current account balance and gross national income. Table 4.2 shows the top 10 positive and negative corrected current account balances for the 2013-2015 period.[26] This correction increases current account imbalances in some countries and reduces them in others. Importantly, the large key surpluses of Germany and Switzerland are reduced (by approximately 19 and 12 percent), but they are exacerbated in Norway and the Netherlands (by 80 and 29 percent respectively). Looking at more notable negative corrections, we find a considerable deterioration in the current account for Luxembourg. Large surpluses in Ireland and Korea are reduced. Moreover, Japan and Spain's current account surpluses switch to deficits. Deficits in Greece, Poland, and Turkey are also made worse by the correction. In relation to other large positive corrections, our correction accentuates large surpluses in Singapore and Sweden. On the other side, the

[25] See Figure 4.10 for adjusted values for 2015. The main equity investors in the Cayman Islands in 2015 were the United States, Japan, and China. Likewise, we perform the same exercise for Bermuda and find similar results.

[26] Bilateral portfolio holdings from the CPIS are only available for the year 2015 in China. The net correction that year amounted to -.43 percent of GDP, which decreased the current account surplus.

correction also dampens the deficit in Canada, Cyprus, and the United States. In Belgium, the average correction is enough to make the current account switch from a small deficit to a small surplus.

Next, we look at another key macroeconomic statistic: gross national income. Overall, correcting for portfolio income will have a smaller impact on the growth of GNI, as we correct the value of GNI in t and t+1. The impact depends not just on the correction, but also the volatility of the correction over time. Table 4.3 shows the top 10 positive and negative corrections of the growth rate of GNI when we account for retained earnings of portfolio investors. It shows an average positive addition of 0.93 percentage points to the average GNI growth between 2013 and 2015 for Norway, 0.31 for Switzerland, and 0.15 for Finland. On the other side, there are on average negative corrections of 2.22 percentage points for Ireland, 0.43 for Luxembourg, and 0.21 for Denmark over the 2013-2015 period. As the median correction is close to 0, we can examine episodes of large corrections, i.e. over 0.5 percentage points change.[27] We see large positive and negative correction episodes in a similar set of highly globalized countries.

Finally, our estimates of retained earnings for portfolio investment can give us insights on external valuation adjustments of countries. It gives us an indication of how much of the stock-flow adjustments on portfolio equity can be accounted for by retained earnings.[28] Figure 4.6 gives us the relationship between the average net correction and the stock-flow adjustment term on net portfolio holdings. We see that there are many countries under the 45-degree line, indicating that for these countries, changes in asset prices (other than due to retained earnings) explain a larger share of the stock-flow adjustment term. For instance, Norway has an average stock-flow adjustment term on net portfolio holdings of 5.5 percent of GDP and a correction of 7.9 percent of GDP. On the contrary, Canada had an average stock-flow adjustment term of 6.2 percent of GDP and 1.9 percent of GDP could be attributed to retained earnings of portfolio investors.[29]

In sum, correcting for retained earnings attributed to portfolio investors increases and decreases measured current account imbalances depending on the structure of the country's external balance sheet. It also gives us insight into large valuation changes of external portfolio balance sheets, where we find a considerable share cannot be accounted for by retained earnings.

[27] See Table 4.9 for more detail. Moreover, Table 4.8 gives the quantiles by year.

[28] There are well-known issues interpreting the stock-flow adjustment term as valuation changes, see Curcuru, Thomas, and Warnock (2009) for a review.

[29] Figure 4.11 for 2013-2015 shows that our net correction can account for a large share of the stock-flow adjustment term for countries like Norway and Sweden, but can go in opposite directions in many countries.

4.4.3 Discussion on Key Financial Centers

We document large net corrections in financial centers, countries that hold a disproportionately large share of external asset and liability.

For Luxembourg, we find a very large correction of -22.9 percent of GDP. However, this figure may not be too surprising given the structure of the Luxembourg economy. This structure is reflected in the primary net income balance of Luxembourg, which has deteriorated steadily in the past years, and its net external portfolio equity position of approximately -3050 percent of GDP.[30] In addition, retained earnings attributed to shareholders of investment funds was measured at approximately 150 percent of GDP on average over the 2013-2015 period. This figure is relatively similar in order of magnitude to the correction for retained earnings of portfolio investors on the asset side (127.5 percent of GDP). This may reflect the large claim to foreign equity holdings of investment funds vis-a-vis the rest of the world. If these holdings are of firms that retain their earnings, the income will be assigned to Luxembourg. In turn, as the BOP attributes retained income of funds to the shareholders, a large share of this income is allocated to foreign investors. On the liability side, Luxembourg's correction is 2.1 percent. Again, this may reflect the statistical convention that retained earnings of investment funds' do not contribute to corporate saving.

In relation to Ireland, another hub for investment funds, the correction is also quite significant (-14.7 of GDP). As in the case of Luxembourg, Ireland is a large external debtor in terms of net portfolio equity (approximately -600 percent of GDP). In addition, a large share of the correction on the asset side is matched by a net debit of retained earnings attributed the shareholders of funds (17.3 and -12.3 percent of GDP respectively). Contrary to Luxembourg, however, Ireland also exhibits a large correction on the liability side (19.6 percent of GDP). This may reflect the contribution of MNEs to gross corporate saving in Ireland. As a large share of these firms is held by foreign investors, this income will be attributed to the external sector. This is also consistent with previous estimates to take into account well-known relocation of group headquarters of a number of large MNC to Ireland for tax purposes, see FitzGerald (2013).

We turn next to another country with a large share of MNE headquarters: the Netherlands. The relatively large correction on the asset side (4.5 percent of GDP) may reflect the size of pension funds' external claims, see Eggelte et al. (2014). In fact, the Netherlands is a net external creditor in terms of portfolio equity (20 percent of GDP). The net retained earnings balance for investment funds is relatively small at 0.4 percent of GDP. As a considerable share

[30] See Table 4.5 for the net external portfolio equity position and Figure 4.12 for the net income balances of selected financial centers.

of MNEs in the Netherlands is held by foreigners, it is not surprising to see a correction of 2.4 percent of GDP on the liability side. Finally, another country with considerable MNE presence is Switzerland. Switzerland is a considerable net debtor in terms of external portfolio equity (around -70 percent of GDP).[31] Overall, the net correction is negative and equal to 2 percent of GDP.[32]

4.5 Concluding Remarks

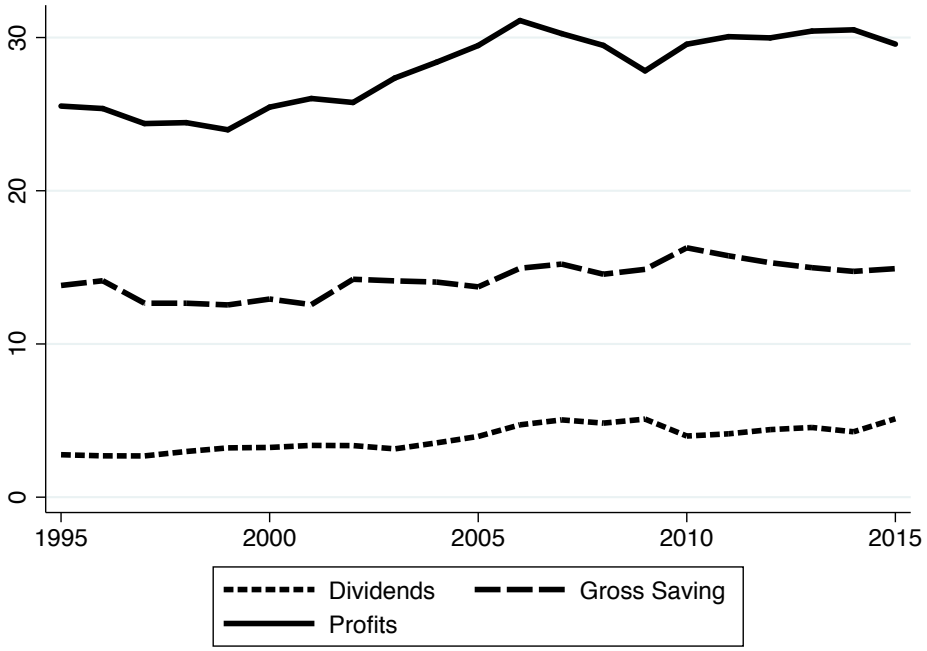
This paper shows that allocating retained earnings to cross-border portfolio investors can lead to a significant redistribution of income between highly globalized economies. Treating direct and portfolio investors similarly can considerably modify two key policy variables: the current account and gross national income. The correction accentuates and decreases global imbalances depending on the country's net external portfolio balance sheet. Overall, the main findings show that caution is needed in the interpretation of key macro statistics. In a world with increasing cross-border holdings of portfolio assets and increasing corporate retained earnings, old statistical assumptions on the timing of the recording of income have an increasing impact of the measurement of flows.

More generally, globalization of finance and production has led to misleading macroeconomic statistics due to a wide range of other factors. A key question remains how do we accurately measure cross-border holdings and transactions? Many initiatives to improve the traditional residency-based national accounting framework have been proposed to address these measurement issues. Information aggregated by nationality of ownership or by the ultimate ownership of assets may provide a clearer picture of external exposures depending on the question at hand.

[31] It should also be noted that the holdings of the Swiss National Bank, the national central bank, are included in our gross corporate saving and external portfolio holdings measures.

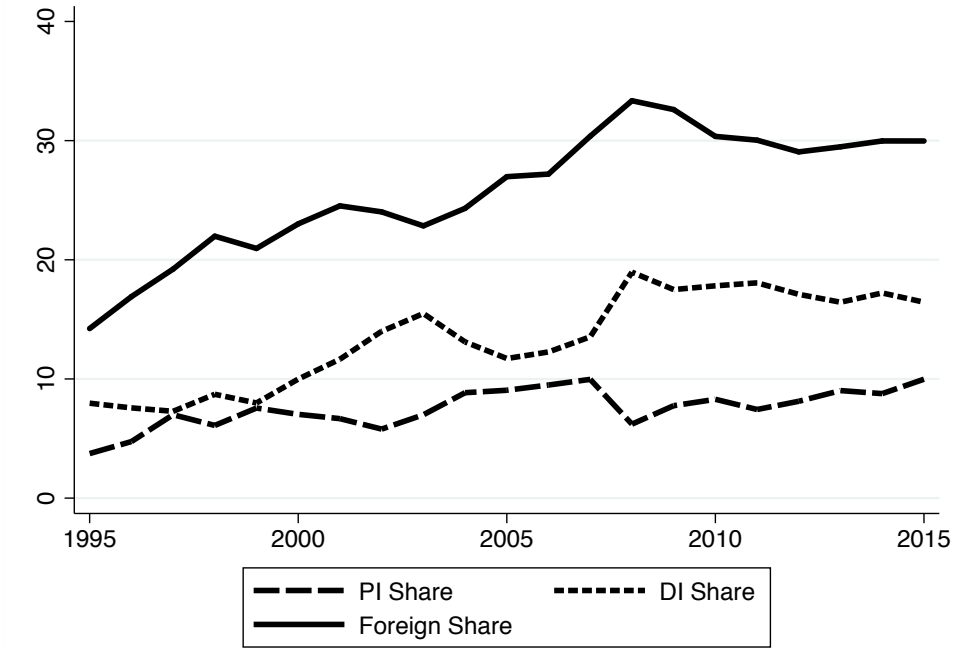
[32] This is at the lower end of estimations for portfolio retained earnings in the IMF's annual consultation of Switzerland. They find overestimations ranging from 3 percent of GDP in 2014 to 7 percent in 2006.

Figure 4.1: Earnings of Corporate Sector: Retained and Distributed



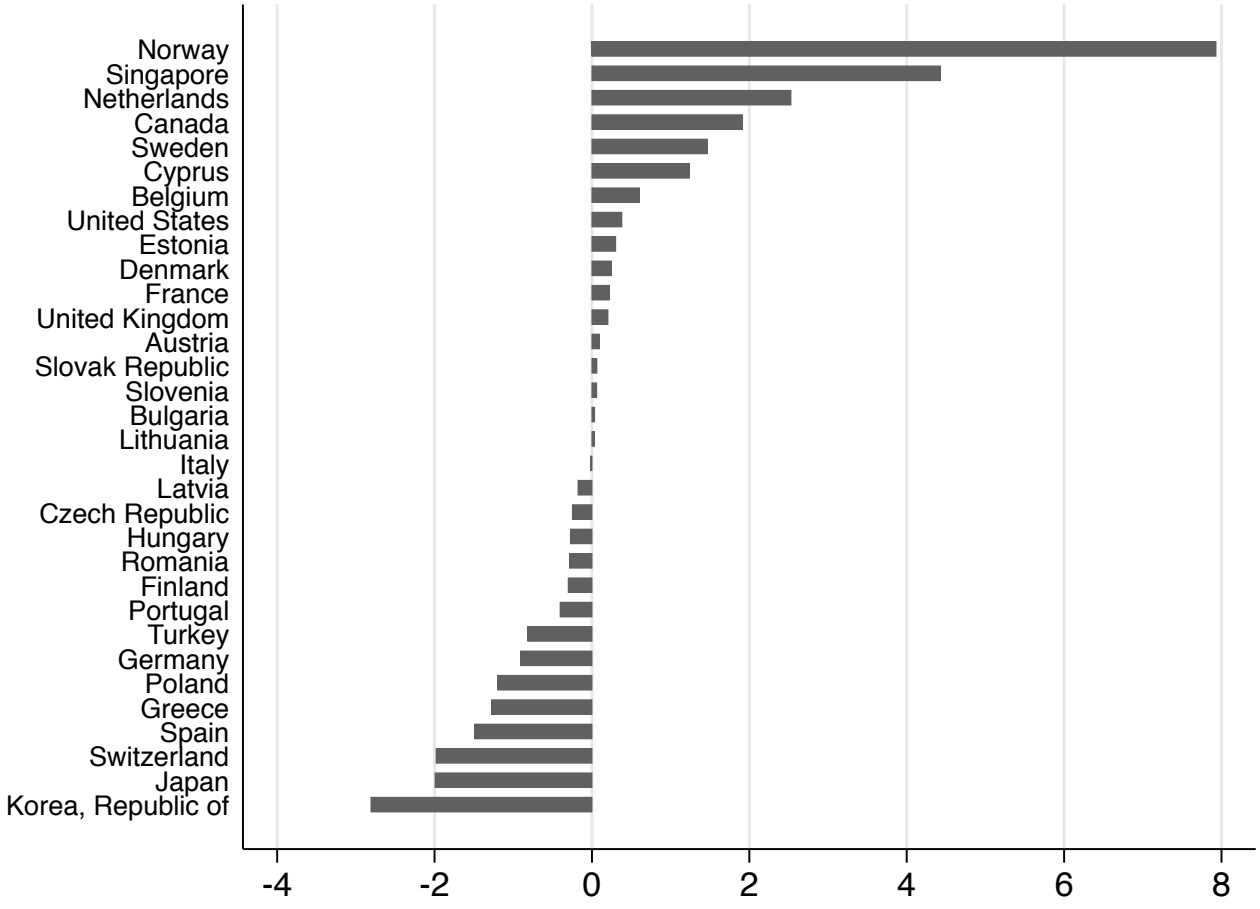
Note: In percent of GDP. Gross Earnings is the Gross Operating Surplus of the non-financial corporate and the financial corporate sector. Gross saving is the after tax gross earnings minus dividends.

Figure 4.2: Foreign Ownership of the Domestic Corporate Sector



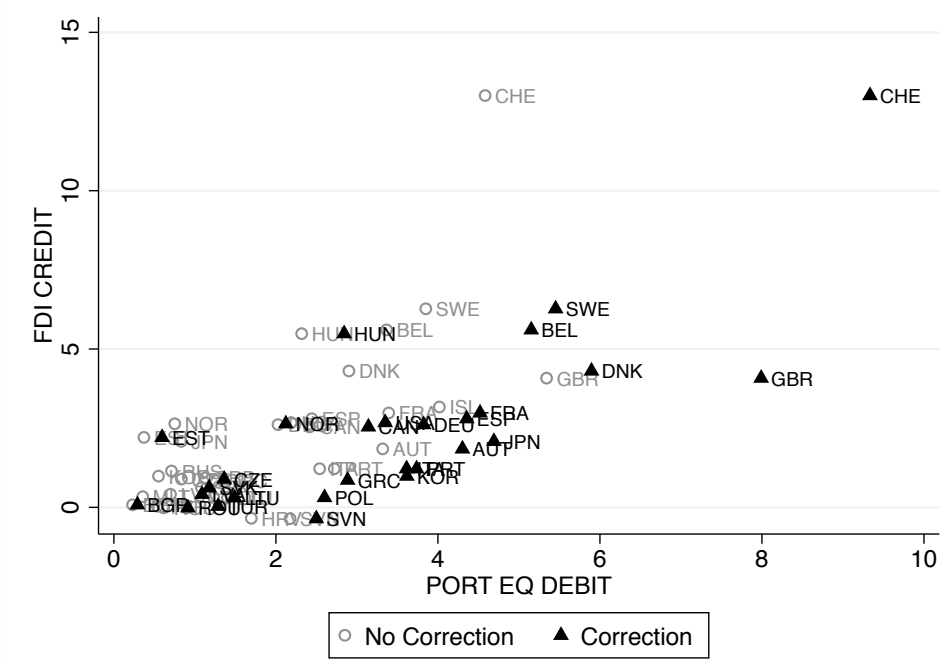
Note: In percent of GDP. Foreign ownership is the equity holdings of portfolio and direct investors relative to domestic outstanding equities (both listed and non-listed firms) of the non-financial corporate and the financial corporate sector.

Figure 4.3: Net Correction of Retained Earnings on Portfolio Investment (2013-2015)



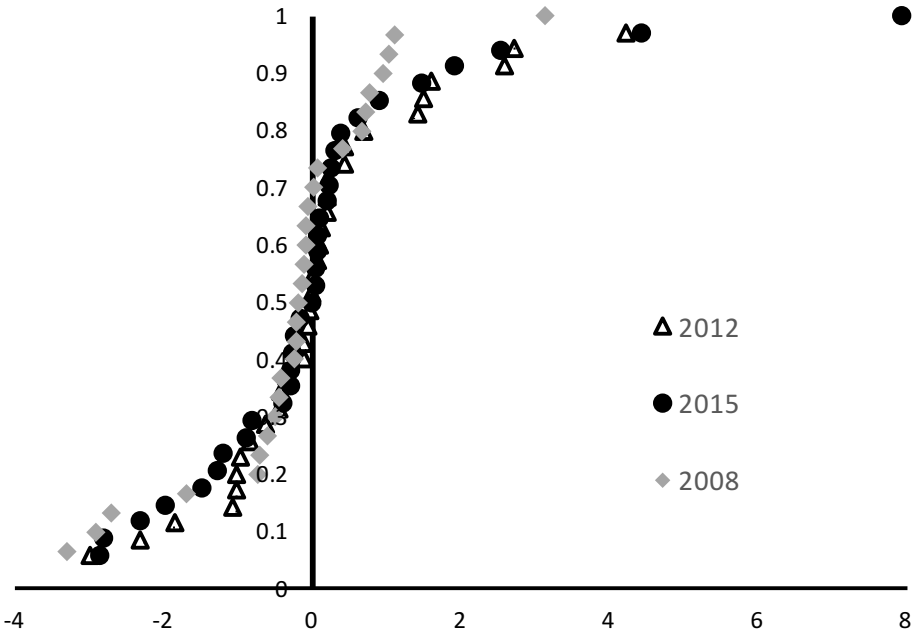
Note: In percent of GDP. Average values from 2013 to 2015. The net correction λ^{NET} is equal to the difference between λ^{A} the correction for retained income on portfolio equity assets and λ^{L} the correction for retained income on portfolio equity liabilities, net of retained earnings of investment funds. We omit Luxembourg (net correction: -27.40) and Ireland (net correction: -14.7) as they exhibit very large corrections.

Figure 4.4: FDI and Portfolio Income Correlation



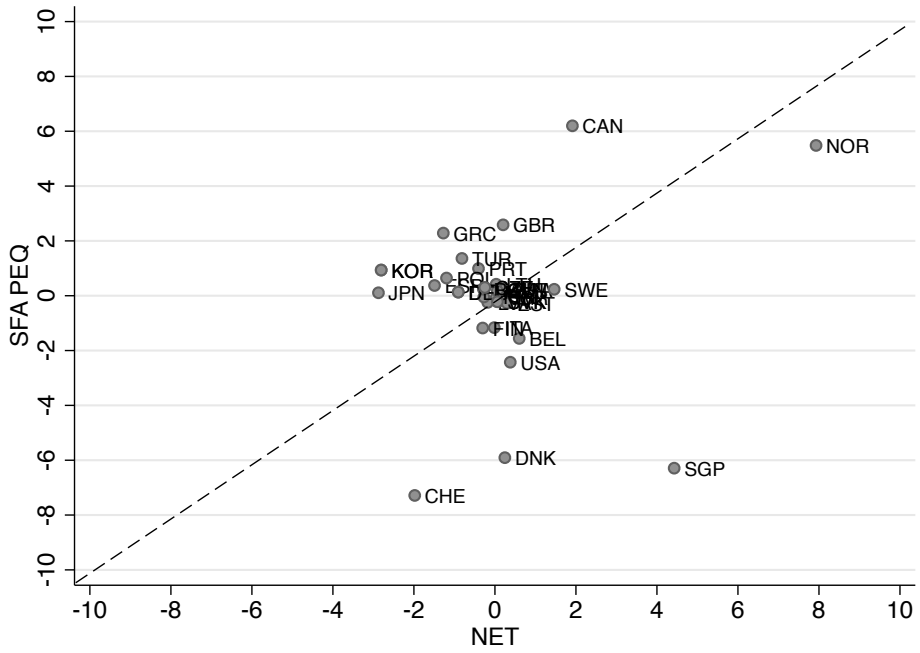
Note: In percent of GDP. Cross country relationship between the average income from FDI assets (credit) and the income allocated to portfolio investors (PORT EQ DEBIT) between 2013 and 2015. We measure the income allocated to portfolio investors with no correction (only income distributed through dividends) and with our correction (with dividends and retained earnings). We omit Luxembourg, the Netherlands, Ireland, and Cyprus as they display extreme values.

Figure 4.5: Net Correction Distributions



Note: In percent of GDP. Distribution of the average cross-country corrections for the years 2006-2008, 2010-2012, and 2013-2015. We omit Luxembourg (net correction: -27.40 in 2013-2015) and Ireland (net correction: -14.7 in 2013-2015) as they exhibit a very large correction.

Figure 4.6: Net Correction and Stock-Flow Adjustment (SFA)



Note: In percent of GDP. Average values for the 2013-2015 period. NET represents the net correction of retained earnings for portfolio investors. SFA PEQ represents the stock-flow adjustment term for net portfolio equity holdings. We omit the following countries due to extreme values: Luxembourg, the Netherlands, Ireland, Malta, and Cyprus.

4.A Data Appendix

Country Coverage: United States, United Kingdom, Austria, Belgium, China, Denmark, France, Germany, Italy, Luxembourg, Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Ireland, Portugal, Spain, Turkey, Cyprus, Korea, Singapore, Bulgaria, Czech Republic, Slovak Republic, Estonia, Latvia, Hungary, Lithuania, Slovenia, Poland, Romania.

Data Sources: National Accounts: Eurostat & OECD financial balance sheets (non consolidated) & National Sources. Balance of Payments: IMF BOP/IIP. Bilateral Portfolio Holdings: Coordinated Portfolio Investment Survey (CPIS) IMF.

Table 4.1: Correction Breakdown by Asset and Liability

Net Positive Correction		λ^A	λ^L	λ^F	λ^{NET}
	Norway	6.9	1.5	2.6	8.2
	Singapore	7.2	2.8		4.4
	Netherlands	4.5	2.4	0.4	2.5
	Canada	2.8	0.8		1.9
	Sweden	3.0	1.6		1.5
	Cyprus	1.2	0.3	0.3	1.2
	Belgium	1.2	1.2	0.5	0.6
	United States	1.6	1.2	0.0	0.4
	Estonia	0.5	0.3	0.1	0.3
	Denmark	2.8	2.6	0.0	0.2
	France	1.3	1.1	0.0	0.2
	United Kingdom	2.8	2.8	0.2	0.2
	Austria	0.9	1.0	0.1	0.1
	Slovak Republic	0.2	0.1		0.1
	Slovenia	0.4	0.3		0.1
	Bulgaria	0.1	0.1		0.0
	Lithuania	0.2	0.1		0.0
	Italy	0.5	1.0	0.4	0.0
Net Negative Correction		λ^A	λ^L	λ^F	λ^{NET}
	Luxembourg	127.5	2.1	-148.9	-22.9
	Ireland	17.3	19.6	-12.3	-14.7
	Korea, Republic of	0.5	3.3		-2.8
	Japan	0.7	3.6	0.9	-2.0
	Switzerland	2.7	4.7		-2.0
	Spain	0.4	1.9		-1.5
	Greece	0.0	1.3		-1.3
	Poland	0.1	1.3		-1.2
	Germany	0.7	1.8	0.2	-0.9
	Turkey	0.0	0.8	0.0	-0.8
	Portugal	0.5	1.1	0.2	-0.4
	Finland	2.1	2.8	0.4	-0.3
	Romania	0.0	0.3	0.0	-0.3
	Hungary	0.2	0.5	0.1	-0.3
	Czech Republic	0.3	0.5	0.0	-0.2
	Latvia	0.1	0.3		-0.2

Note: In percent of GDP. Average values from 2013 to 2015. λ^A is the asset-side correction of retained earnings for portfolio investors, λ^L is the liability-side correction, λ^F is the retained earnings for investment funds, and λ^{NET} is the net correction.

Table 4.2: Current Account Balance Adjustment (2013-2015)

Net Positive Correction		CA	λ^{Net}	CA*
	Norway	9.8	8.2	17.9
	Singapore	18.4	4.4	22.8
	Netherlands	9.1	2.5	11.6
	Canada	-3.0	1.9	-1.1
	Sweden	4.9	1.5	6.3
	Cyprus	-3.6	1.2	-2.4
	Belgium	-0.4	0.6	0.2
	United States	-2.2	0.4	-1.8
	Estonia	0.9	0.3	1.2
	Denmark	8.6	0.2	8.9
Net Negative Correction		CA	λ^{Net}	CA*
	Luxembourg	5.3	-22.9	-17.6
	Ireland	7.3	-14.7	-7.4
	Korea, Republic of	6.6	-2.8	3.8
	Japan	1.7	-2.0	-0.3
	Switzerland	10.5	-2.0	8.5
	Spain	1.2	-1.5	-0.3
	Greece	-1.3	-1.3	-2.6
	Poland	-1.3	-1.2	-2.5
	Germany	7.6	-0.9	6.7
	Turkey	-5.9	-0.8	-6.7

Note: In percent of GDP. Top and bottom 10 average values from 2013 to 2015. CA is the average current account balance for the 2013-2015 period, λ^{NET} is the average net correction on retained earnings for portfolio investors, and CA* is average current account balance accounting for retained earnings for portfolio investors.

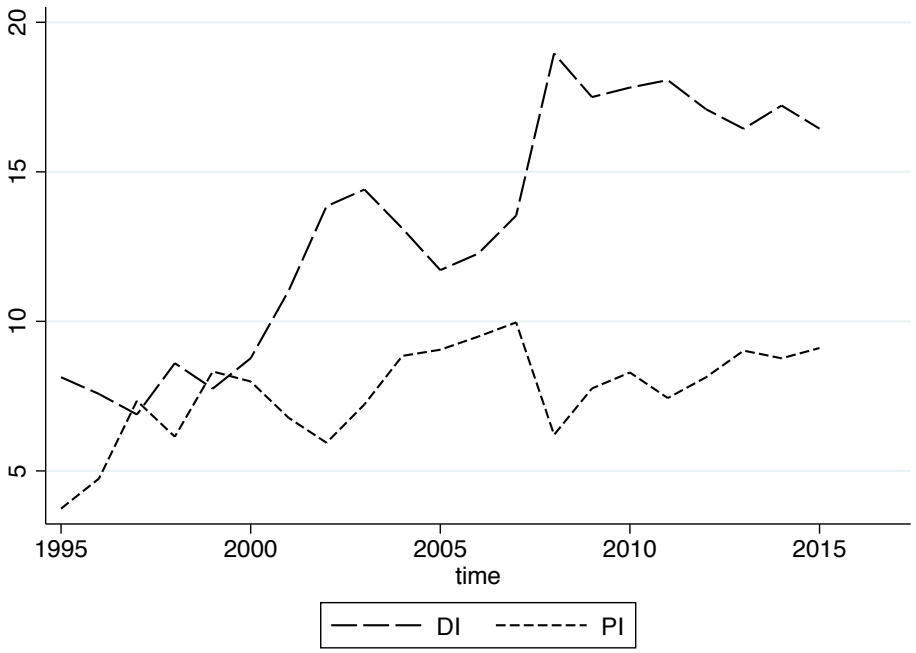
Table 4.3: GNI Growth Adjustments

Net Positive Correction		GNI	GNI*	Δ
	Norway	-0.3	0.6	2.8
	Switzerland	4.7	5.0	0.9
	Finland	1.9	2.0	0.5
	Germany	3.7	3.8	0.2
	Korea, Republic of	4.0	4.0	0.2
	Estonia	4.4	4.5	0.1
	Czech Republic	5.0	5.0	0.1
	Canada	2.9	3.0	0.1
	Belgium	1.9	1.9	0.1
	France	3.2	3.2	0.1
Net Negative Correction		GNI	GNI*	Δ
	Ireland	13.5	11.2	-6.6
	Luxembourg	5.4	5.0	-1.3
	Denmark	3.8	3.6	-0.6
	Sweden	3.2	3.0	-0.5
	Netherlands	1.9	1.8	-0.5
	Spain	3.0	2.9	-0.1
	Slovenia	2.6	2.6	-0.1
	Hungary	4.1	4.1	-0.1
	Austria	2.9	2.9	0.0
	United States	3.9	3.9	0.0

Note: Top and bottom 10 average values from 2013 to 2015. Δ cumulated the percentage point change in GNI growth adjusted for the net correction of retained earnings on portfolio equity.

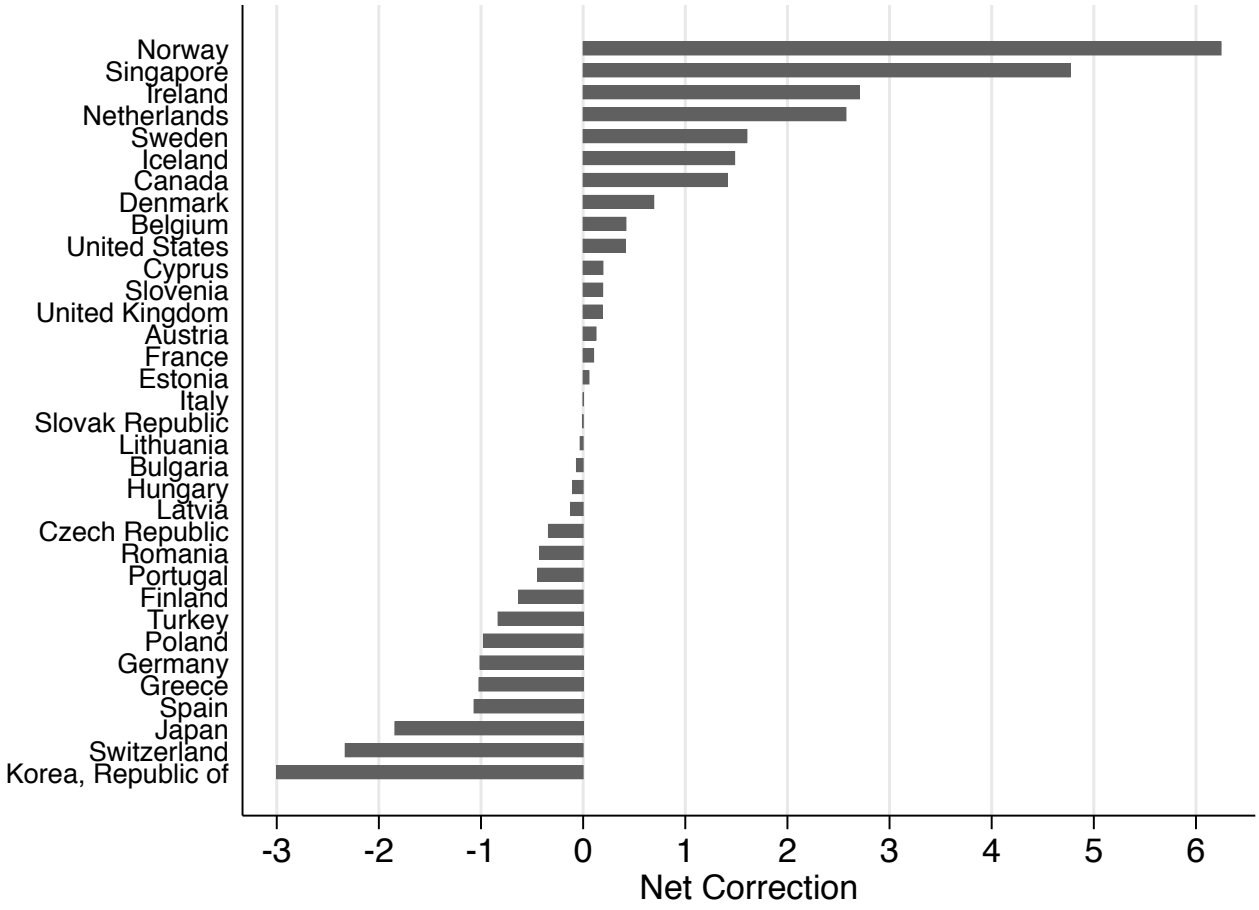
4.B Additional Figures and Tables

Figure 4.7: Share of Gross Saving Attributed to Portfolio and Direct



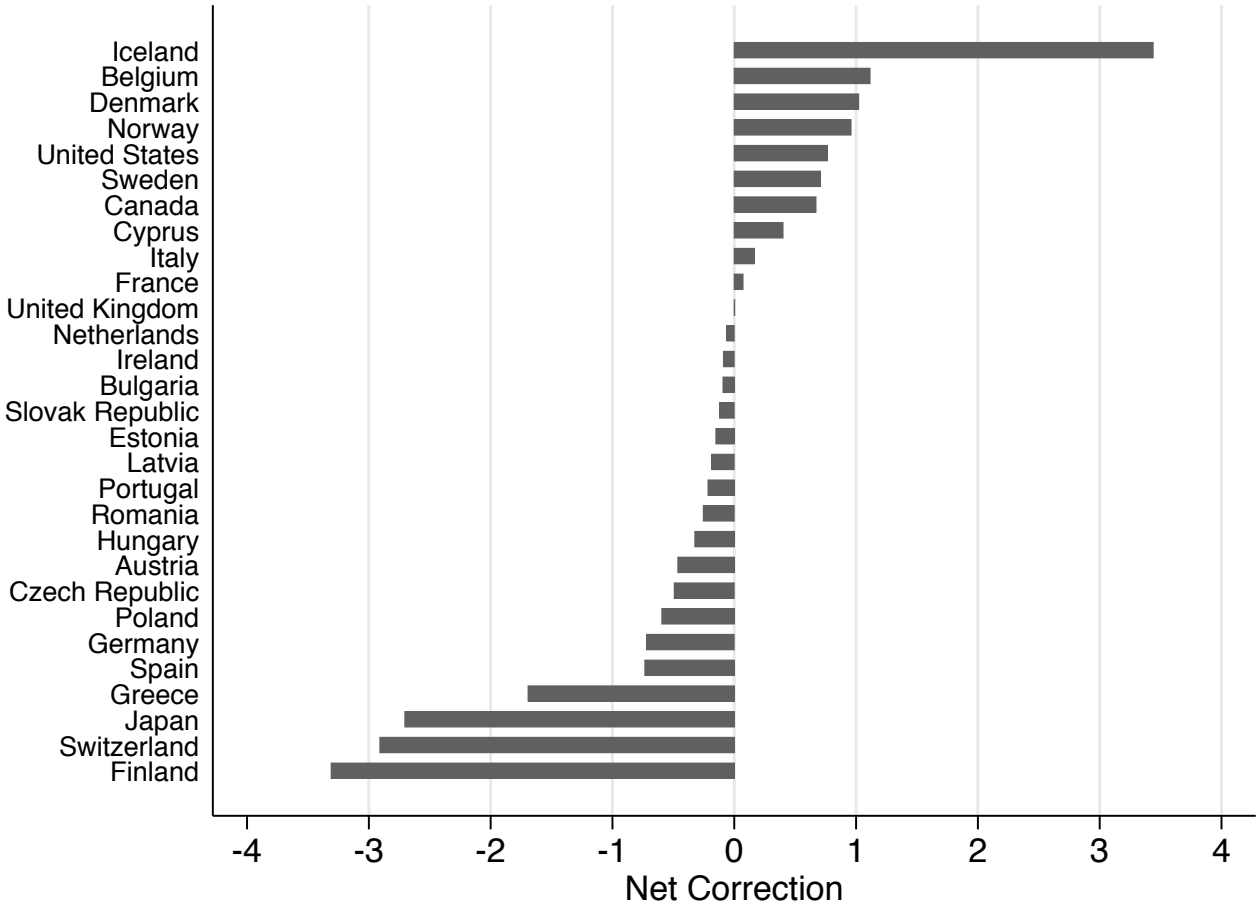
Note: Median share of "imputed retained earnings" in total gross saving of the NFC and FC sector. In percent of GS. DI is direct investment and PI is portfolio investment.

Figure 4.8: Net Correction of Retained Earnings on Portfolio Investment (2010-2012)



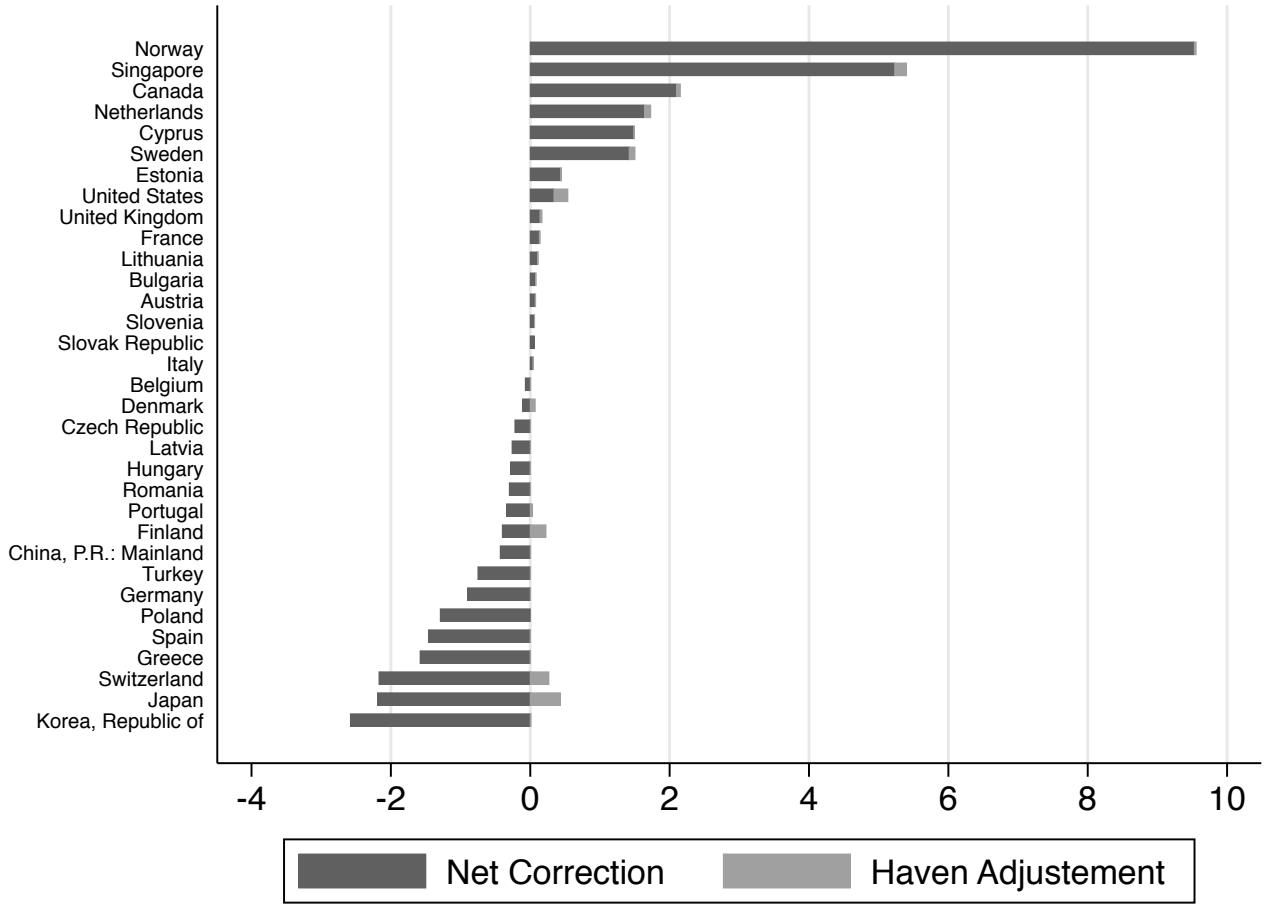
Note: In percent of GDP. Average values from 2010 to 2012. The net correction λ^{NET} is equal to the difference between λ^{A} the correction for retained income on portfolio equity assets and λ^{L} the correction for retained income on portfolio equity liabilities, net of retained earnings of investment funds. We omit Luxembourg as it exhibits a very large correction.

Figure 4.9: Net Correction of Retained Earnings on Portfolio Investment (2006-2008)



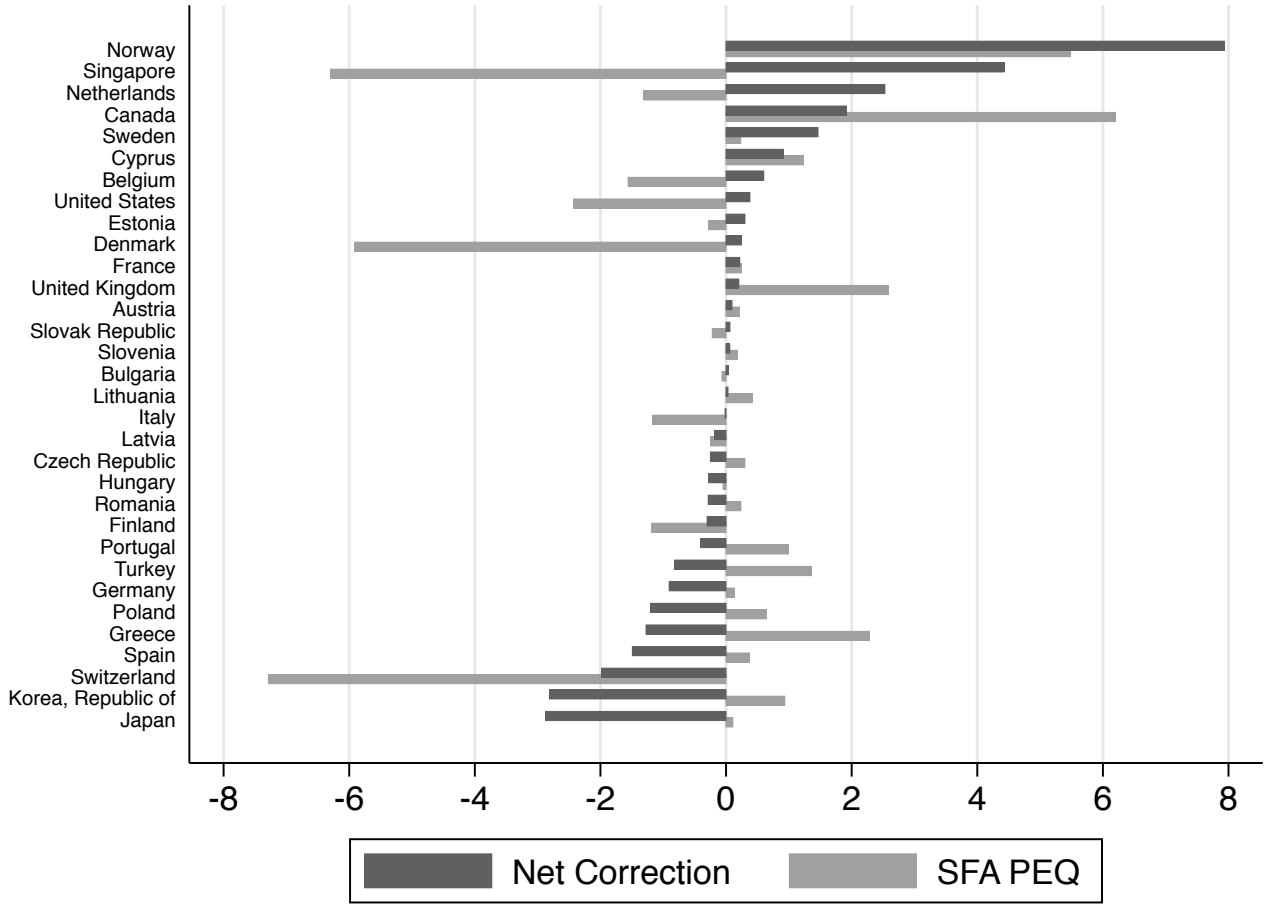
Note: In percent of GDP. Average values from 2006 to 2007. The net correction λ^{NET} is equal to the difference between λ^{A} the correction for retained income on portfolio equity assets and λ^{L} the correction for retained income on portfolio equity liabilities, net of retained earnings of investment funds. We omit Luxembourg as it exhibits a very large correction.

Figure 4.10: Net Correction of Retained Earnings on Portfolio Investment with Haven Adjustment



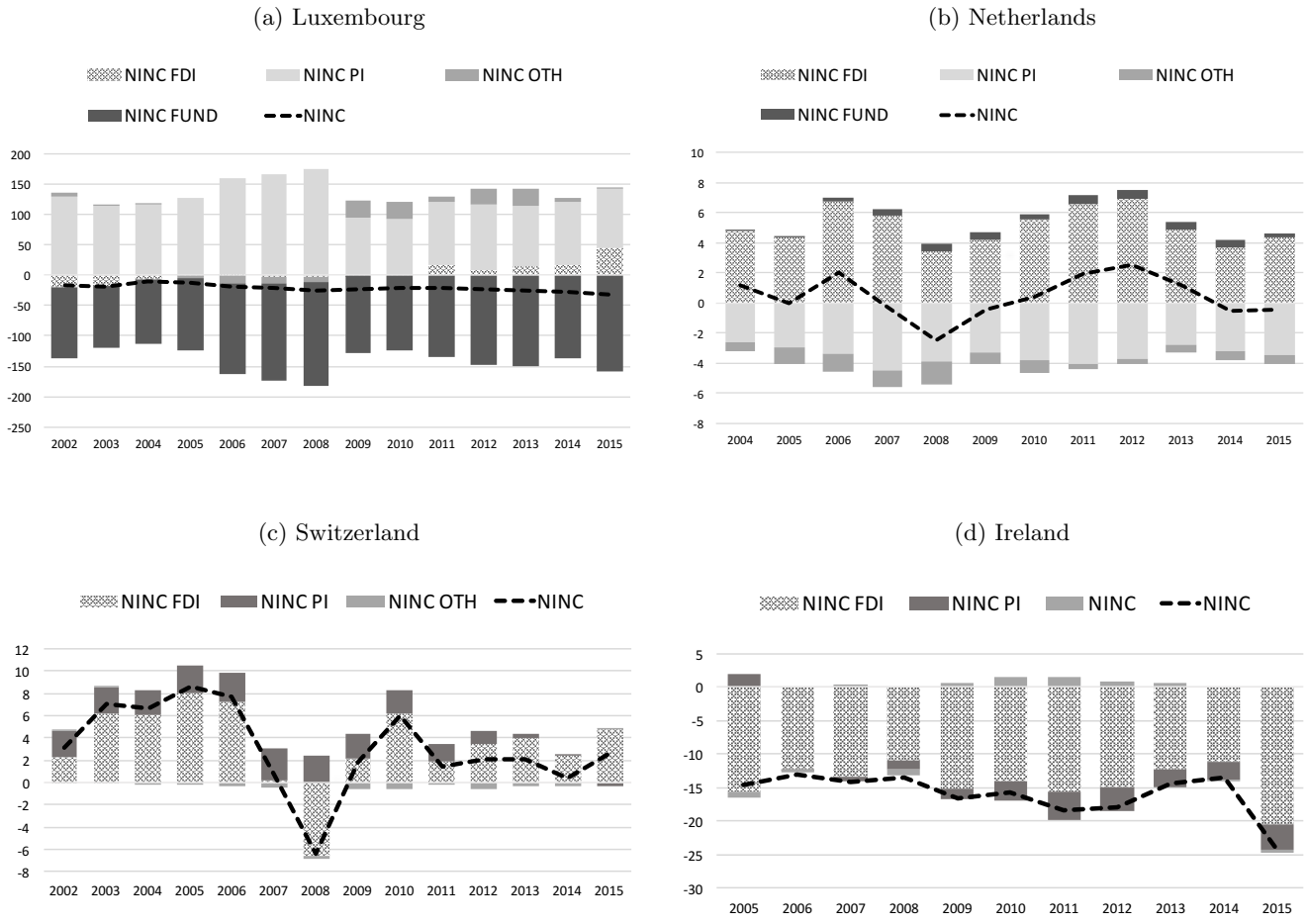
Note: In percent of GDP. Values for 2015. The net correction λ^{NET} is equal to the difference between λ^{A} the correction for retained income on portfolio equity assets and λ^{L} the correction for retained income on portfolio equity liabilities, net of retained earnings of investment funds. Haven Adjustment corrects for the share of each countries' portfolio equity assets in the Cayman Islands. We omit Luxembourg (net correction: -27.4; haven adjustment: 3.9) and Ireland (net correction: -20.56; haven adjustment: 0.56) as they exhibit very large corrections.

Figure 4.11: Net Correction (2013-2015) and Stock-Flow Adjustment (SFA)



Note: In percent of GDP. Average values from 2013 to 2015. The net correction λ^{NET} is equal to the difference between λ^{A} the correction for retained income on portfolio equity assets and λ^{L} the correction for retained income on portfolio equity liabilities. SFA is the stock-flow adjustment term on net portfolio equity investment. We drop Luxembourg and Ireland who are extreme outliers in terms of negative EQ SFA.

Figure 4.12: Net Primary Income Balance of Selected Financial Centers



Note: In percent of GDP. Net primary income balance (NINC) and its components for FDI (NINC FDI), portfolio investors (NINC PI), and other investors (NINC OTH). Moreover, portfolio investors can be decomposed into net retained earnings to investment fund shareholders (NINC FUND) and the rest for Luxembourg and the Netherlands.

Table 4.4: Foreign Asset Coverage of Sample in 2015

Country	Coverage
United States	80.90
United Kingdom	81.1
Austria	96.2
Belgium	97.9
Denmark	91.9
France	95.6
Germany	97.7
Italy	99.1
Luxembourg	87.8
Netherlands	90.3
Norway	89.4
Sweden	94.2
Switzerland	92.3
Canada	91.7
Japan	92.2
Finland	95.4
Greece	99.8
Iceland	97
Ireland	89.6
Malta	1.39
Portugal	93.4
Spain	96.4
Turkey	93.8
Mexico	98.8
Cayman Islands	90.8
Cyprus	96.2
Korea, Republic of	87.5
Singapore	64.2
Bulgaria	99.7
Russian Federation	62.3
China, P.R.: Mainland	73.6
Czech Republic	97.6
Slovak Republic	99.9
Estonia	99
Latvia	97.5
Hungary	97.5
Lithuania	99.6
Croatia	
Slovenia	93.8
Poland	70.8
Romania	96.7

Note: Share of foreign assets covered by the sample over total foreign assets.

Table 4.5: Gross Saving and Net Portfolio Equity Positions

Net Positive Correction		GS	NPEQ	λ^{Net}
	Norway	17.4	113.5	8.2
	Singapore	36.8	107.7	4.4
	Netherlands	19.7	20.3	2.5
	Canada	12.5	29.6	1.9
	Sweden	14.7	25.1	1.5
	Cyprus	11.9	5.7	1.2
	Belgium	15.8	33.3	0.6
	United States	12.1	2.5	0.4
	Estonia	15.6	8.9	0.3
	Denmark	20.5	12.0	0.2
Net Negative Correction		GS	NPEQ	λ^{Net}
	Luxembourg	5.5	-3048.4	-22.9
	Ireland	27.1	-595.0	-14.7
	Korea, Republic of	20.5	-16.7	-2.8
	Japan	23.4	-5.5	-2.0
	Switzerland	14.1	-68.4	-2.0
	Spain	18.1	-8.1	-1.5
	Greece	13.4	-2.5	-1.3
	Poland	17.8	-4.6	-1.2
	Germany	13.2	4.2	-0.9
	Turkey	12.6	-6.5	-0.8

Note: In percent of GDP. Top and bottom 10 average values from 2013 to 2015. NPEQ is the net portfolio equity position, GS is gross saving of the corporate sector and λ^{Net} is the net correction of retained earnings on portfolio equity.

Table 4.6: Descriptive Statistics 1

		2000-2007			2008-2010			2011-2015		
High GS countries		Profit	GS	DIV	Profit	GS	DIV	Profit	GS	DIV
	Belgium	32.0	15.2	12.6	35.1	15.7	15.3	34.4	16.2	13.5
	Bulgaria	27.3	18.0	2.8	25.7	19.7	4.0	29.4	23.4	3.9
	Czech Republic	29.5	16.1	6.4	30.7	15.3	9.3	32.1	15.8	10.3
	Denmark	28.7	17.0	8.0	28.5	18.6	7.5	32.7	20.4	8.6
	Estonia	33.4	17.6	5.1	28.3	13.3	6.0	32.9	16.0	7.9
	Finland	31.0	17.4	9.2	28.5	16.0	9.8	25.9	14.2	10.0
	Ireland	40.7	15.3	13.9	39.0	14.2	11.3	52.8	23.0	12.8
	Japan	29.2	22.6	2.4	29.4	23.0	2.9	32.0	23.1	4.3
	Latvia	34.1	17.1	12.8	28.6	20.2	9.9	32.7	21.4	7.7
	Netherlands	41.8	18.7	15.4	45.1	19.8	20.2	52.5	20.7	24.4
	Norway	39.8	14.6	14.2	39.3	15.8	12.7	39.2	16.6	13.7
	Romania	24.2	18.5	2.9	26.4	23.1	2.6	30.6	18.1	12.4
	Slovak Republic	25.7	16.6	4.0	29.3	17.1	7.5	29.1	17.9	6.3
	Sweden	37.7	18.7	14.9	38.1	17.2	17.0	38.0	15.0	18.6
	Switzerland	37.4	18.1	14.5	39.5	14.3	19.4	41.6	14.7	21.2
		2000-2007			2008-2010			2011-2015		
Low GS countries		Profit	GS	DIV	Profit	GS	DIV	Profit	GS	DIV
	Austria	29.1	14.1	11.6	29.0	15.5	11.3	28.0	15.8	10.5
	Cyprus	32.7	3.1	19.2	47.5	7.4	28.6	56.4	11.5	
	France	26.2	11.2	11.3	27.9	11.3	13.1	25.2	10.3	10.9
	Germany	28.4	12.2	13.9	29.0	12.7	14.4	28.1	13.2	12.3
	Greece	19.9	11.8	4.3	18.0	11.4	3.3	19.9	13.2	2.5
	Hungary	24.9	13.4	6.1	31.9	15.5	10.3	32.2	16.9	9.1
	Iceland	16.7	8.5	3.3	4.2	3.4	2.9	22.5	10.4	9.1
	Italy	25.5	9.6	12.4	23.1	8.9	10.7	38.5	18.5	16.8
	Lithuania	33.0	11.1	18.4	33.3	15.3	16.6	239.0	5.9	156.3
	Luxembourg	160.1	11.9	85.4	147.2	7.1	99.4	25.1	17.4	5.0
	Poland	19.4	11.6	4.5	23.3	15.2	5.0	24.6	12.5	8.6
	Portugal	21.9	9.4	7.8	23.5	8.4	10.8	18.6	15.2	2.5
	Slovenia	19.0	14.3	1.8	18.3	13.9	2.6	28.1	17.6	6.8
	Spain	21.0	11.2	4.9	25.3	15.7	6.1	38.7	13.0	21.6
	United Kingdom	26.0	10.7	11.5	25.5	11.0	11.0	24.8	10.8	10.5
	United States	20.5	11.2	6.2	21.7	12.2	6.8	23.8	12.5	8.0

Note: In percent of GDP. Average values per period. Countries are classified into High (Low) Gross Saving (GS) if the median of corporate saving over time is above (below) the cross-country median. Profit is corporate gross operating surplus, GS is gross corporate saving, DIV is dividends.

Table 4.7: Descriptive Statistics 2

		2007			2010			2015		
High FO countries		ALL	DI	PI	ALL	DI	PI	ALL	DI	PI
	Austria	33.4	23.3	10.1	30.4	23.6	6.8	33.4	27.1	6.3
	Belgium	37.2	33.6	3.6	43.4	39.4	4.1	43.3	32.2	11.1
	Bulgaria	17.5	16.8	0.7	33.8	33.2	0.6	38.4	38.1	0.3
	Croatia	32.8	31.0	1.8	29.7	28.6	1.1	34.9	33.9	1.0
	Cyprus	18.4	17.1	1.2	75.4	73.2	2.2	91.7	89.3	2.4
	Czech Republic	43.4	38.0	5.4	48.9	44.8	4.1	53.6	50.5	3.1
	Estonia	34.3	29.3	5.0	40.0	36.9	3.1	37.2	35.6	1.6
	Finland	44.6	10.6	34.0	31.8	13.6	18.2	32.8	12.0	20.8
	Hungary	65.3	60.9	4.3	67.7	63.6	4.1	62.4	59.1	3.2
	Ireland	78.1	14.7	63.5	85.3	14.7	70.7	88.6	17.1	71.5
	Latvia	38.1	36.4	1.6	41.0	39.9	1.1	46.4	44.3	2.1
	Lithuania	32.4	30.6	1.8	27.7	26.5	1.2	27.1	26.6	0.5
	Luxembourg	72.7	22.4	50.3	74.9	27.7	47.2	72.2	35.3	36.9
	Malta				91.3	87.0	4.4	90.0	87.5	2.5
	Netherlands	81.2	63.1	18.1	66.1	54.9	11.2	73.2	58.6	14.6
	Poland	28.5	23.0	5.4	37.4	31.1	6.3	35.8	28.3	7.5
	Portugal	28.1	16.7	11.4	28.2	17.8	10.4	34.1	25.8	8.3
	Romania	32.9	31.3	1.6	38.8	37.4	1.4	44.6	41.5	3.0
	Slovak Republic	63.3	62.1	1.2	55.2	54.7	0.4	57.6	57.0	0.6
	Switzerland	55.8	19.4	36.4	56.7	27.7	29.0	57.9	26.4	31.5
	United Kingdom	36.6	13.5	23.1	37.8	14.8	23.0	44.4	17.8	26.7
		2007			2010			2015		
Low FO countries		ALL	DI	PI	ALL	DI	PI	ALL	DI	PI
	Canada							19.4	12.7	6.7
	Denmark	15.8	8.9	6.9	16.4	8.0	8.4	21.8	7.0	14.8
	France	15.7	5.9	9.9	17.2	7.6	9.6	17.6	7.4	10.1
	Germany	26.1	10.9	15.2	25.6	12.0	13.7	23.9	10.6	13.2
	Greece	30.4	10.5	19.8	34.5	22.2	12.3	26.1	14.1	11.9
	Iceland	14.0	9.1	5.0	4.9	3.7	1.2	13.7	12.5	1.2
	Italy	16.7	6.7	10.0	17.4	9.3	8.1	22.0	11.7	10.3
	Japan	18.4	1.5	17.0	14.4	2.5	11.9	18.1	1.8	16.3
	Korea				22.6	6.5	16.1	22.2	7.1	15.1
	Norway	22.9	8.9	14.0	20.0	10.3	9.7	19.6	11.2	8.4
	Slovenia	14.5	12.1	2.4	17.7	16.2	1.5	22.4	20.3	2.1
	Spain	21.6	11.2	10.3	23.9	15.6	8.3	25.4	15.1	10.3
	Sweden	20.6	10.3	10.3	20.9	11.4	9.5	20.7	9.9	10.7
	Turkey				24.1	18.0	6.1	26.7	20.9	5.9
	United States	13.8	6.8	7.0	15.1	6.8	8.3	17.9	8.0	9.8

Note: In percent of domestic equity. Countries are classified into High (Low) Foreign Ownership (FO) if the median of total foreign ownership over time is above (below) the cross-country median. ALL is share of total foreign ownership of domestic equity, DI is the share of direct investor ownership, PI is the share of portfolio investor ownership.

Table 4.8: GNI Adjustment Distribution

Year	10th	25th	50th	75th	90th
2005	-0.27	-0.17	-0.02	0.13	0.31
2006	-0.54	-0.09	0.00	0.13	0.32
2007	-0.40	-0.17	0.02	0.13	0.36
2008	-0.51	-0.16	-0.02	0.08	0.76
2009	-0.39	-0.09	0.06	0.28	1.28
2010	-0.34	-0.08	0.04	0.41	1.48
2011	-0.42	-0.09	0.01	0.27	1.49
2012	-0.31	-0.09	0.01	0.09	0.21
2013	-0.31	-0.07	0.00	0.05	0.23
2014	-0.15	-0.05	-0.02	0.08	0.34
2015	-0.40	-0.06	0.00	0.08	0.44

Note: Percentile of the percentage point change in GNI growth adjusted for the net correction of retained earnings on portfolio equity.

Table 4.9: Large GNI Adjustment Episodes

Net Positive Correction	(over 0.5 pp)	Years
	Denmark	2006, 2007
	Luxembourg	2005, 2010, 2011, 2014, 2015
	Netherlands	2008, 2009, 2010
	Norway	2008, 2009, 2010, 2011, 2014
	Sweden	2010
	Switzerland	2008, 2009
	Finland	2004, 2005, 2009, 2010, 2011, 2012
	Iceland	2006, 2007, 2009
	Ireland	2009, 2010, 2011
Large Net Negative Correction	**(over 0.5 pp)**	**Years**
	Luxembourg	2006, 2007, 2008, 2009, 2012, 2013
	Netherlands	2006, 2015
	Norway	2006
	Switzerland	2004, 2005, 2011
	Finland	2007
	Iceland	2008, 2009, 2011
	Ireland	2008, 2012, 2013, 2014, 2015

Note: Episodes of change larger than 0.5 percentage points in GNI growth adjusted for the net correction of retained earnings on portfolio equity.

Chapter 5

General Conclusion

The global financial crisis of 2007-2008 highlighted the need for a broader set of databases for policymakers to better assess the economy. In 2009, G-20 Finance Ministers and Central Bank Governors (FMCGB) endorsed 20 recommendations to address these shortcomings called Data Gaps Initiatives (DGI).[1] This has resulted in an increase in the availability of sectoral financial accounts data. Many important international macroeconomics questions can be answered using this data. In particular, this thesis presents insights from sectoral data for the analysis of cross-border transactions (Chapter 2), cross-border holdings (Chapter 3), and the measurement of cross-border flows (Chapter 4).

In Chapter 2, we have sought to better understand global imbalances and external adjustments in advanced countries by analyzing their domestic sectoral counterpart. Our main findings shed light on a rather limited role for the household sector in explaining these trends, in contrast to the non-financial corporate and government sectors. These findings are somewhat at odds with the widespread narrative that the household sector plays a central role in current account dynamics. These results hold for: (i) the contribution of domestic balances to current account imbalances; (ii) the co-movement with a widely-used set of medium-run covariates of the current account; (iii) the external adjustment in the aftermath of the global financial crisis; and (iv) the dynamics of domestic flows during large and persistent current account imbalance episodes.

The results suggest that there are valuable insights to be obtained from integrating domestic sectoral balance into the analysis of global imbalances. We argue that models trying to understand external imbalances and adjustments should take into account the diverging patterns between the non-financial corporate and household sectors saving and investment dynamics.

[1] This initiative is led by the Financial Stability Board (FSB) and the International Monetary Fund (IMF).

On the policy side, tackling potential distortions in the non-financial corporate sector, with regards to its funding mechanisms, for instance, might be more likely to generate balanced current accounts than policies aimed at the household sector. However, this chapter still leaves open a series of important questions. In particular, there is little consensus on the underlying sources of the shift of the non-financial corporate sector towards becoming a net lender of funds and the sector's relationship with the rest of the world. This raises interesting challenges for future research.

In Chapter 3, we relate the rise in household wealth to a deterioration of the net international investment position in a sample of advanced countries over the 1970-2013 period. In particular, increases in household wealth changes due valuation adjustments are strongly associated with changes in the net international debt position, but not the net international equity position, providing suggestive evidence of potential housing wealth and collateral effects.

In relation to our main findings, we observe conflicting signs in the covariation patterns between the savings side of wealth accumulation and the valuation adjustment. Indeed, we find that (lagged) saving induced wealth accumulation is positively (and not always significantly) correlated with the net international investment position and the cumulated current account, while the capital gains induced wealth is the force driving the negative correlation. A related issue is how much households believe that the increase in wealth due to capital gains is transitory or permanent? Following the permanent income hypothesis, households would be more likely to increase savings in response to the increase in temporary "excess wealth", leading to a current account surplus. However, capital gains are persistent over time, leading us to believe households see it as a permanent increase in wealth. Moreover, breaking down aggregate household wealth into its housing assets and financial assets and liabilities components, we see the negative correlation is driven by housing assets and financial liabilities (mainly mortgage loans for households). Indeed, household financial assets are surprisingly not significantly correlated with the net international investment position. Similarly, if we look at the net international debt and equity positions, we see that household wealth is also negatively associated with the net international debt position also through its housing components (assets and liabilities). This gives further evidence that real estate dynamics and external vulnerabilities are strongly linked.

Chapter 4 shows that allocating retained earnings to cross-border portfolio investors can lead to a significant redistribution of income between highly globalized economies. Treating direct and portfolio investors similarly can considerably modify key policy variables that are the current account and gross national income. The correction accentuates and decreases global imbalances depending on the country's net external portfolio balance sheet. Overall, the main findings show that caution is needed in the interpretation of key macro statistics. In

a world with increasing cross-border holdings of portfolio assets and increasing corporate retained earnings, old statistical assumptions on the timing of the recording of income have an increasing impact of the measurement of flows.

More generally, globalization of finance and production has led to misleading macroeconomic statistics due to a wide range of other factors. A key question remains how do we accurately measure cross-border holdings and transactions? Many initiatives to improve the traditional residency-based national accounting framework have been proposed to address these measurement issues. Information aggregated by nationality of ownership or by the ultimate ownership of assets may provide a clearer picture of external exposures depending on the question at hand. These issues are sure to provide important challenges for future research.

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